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DURING THE

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1855-'56.

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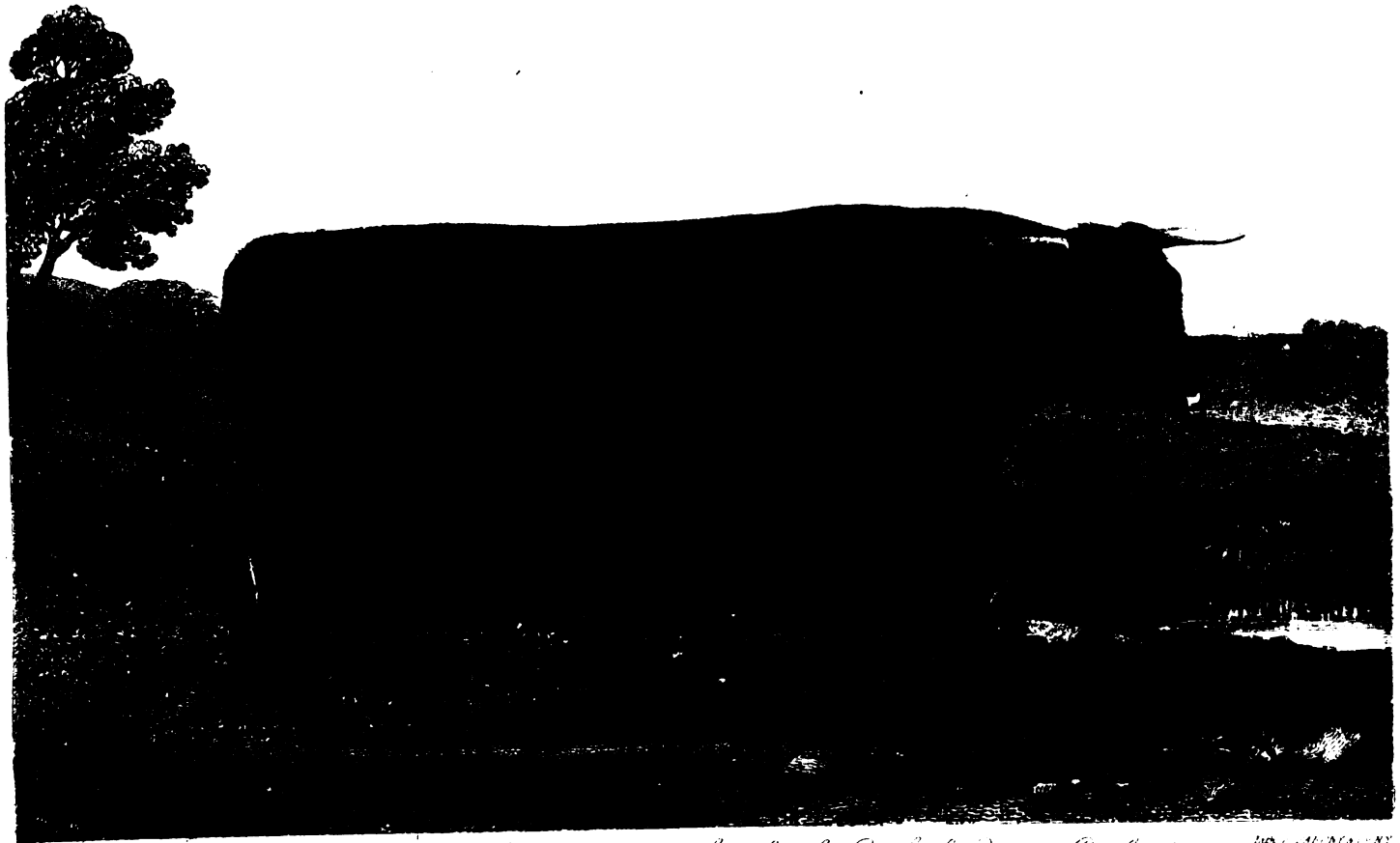


North Devon Bull Monarch, bred by the Earl of Leicester, England

North Devon Ox. bred by the Earl of Leicester, England.

Pl. IV.

MALE CASHMERE GOAT.

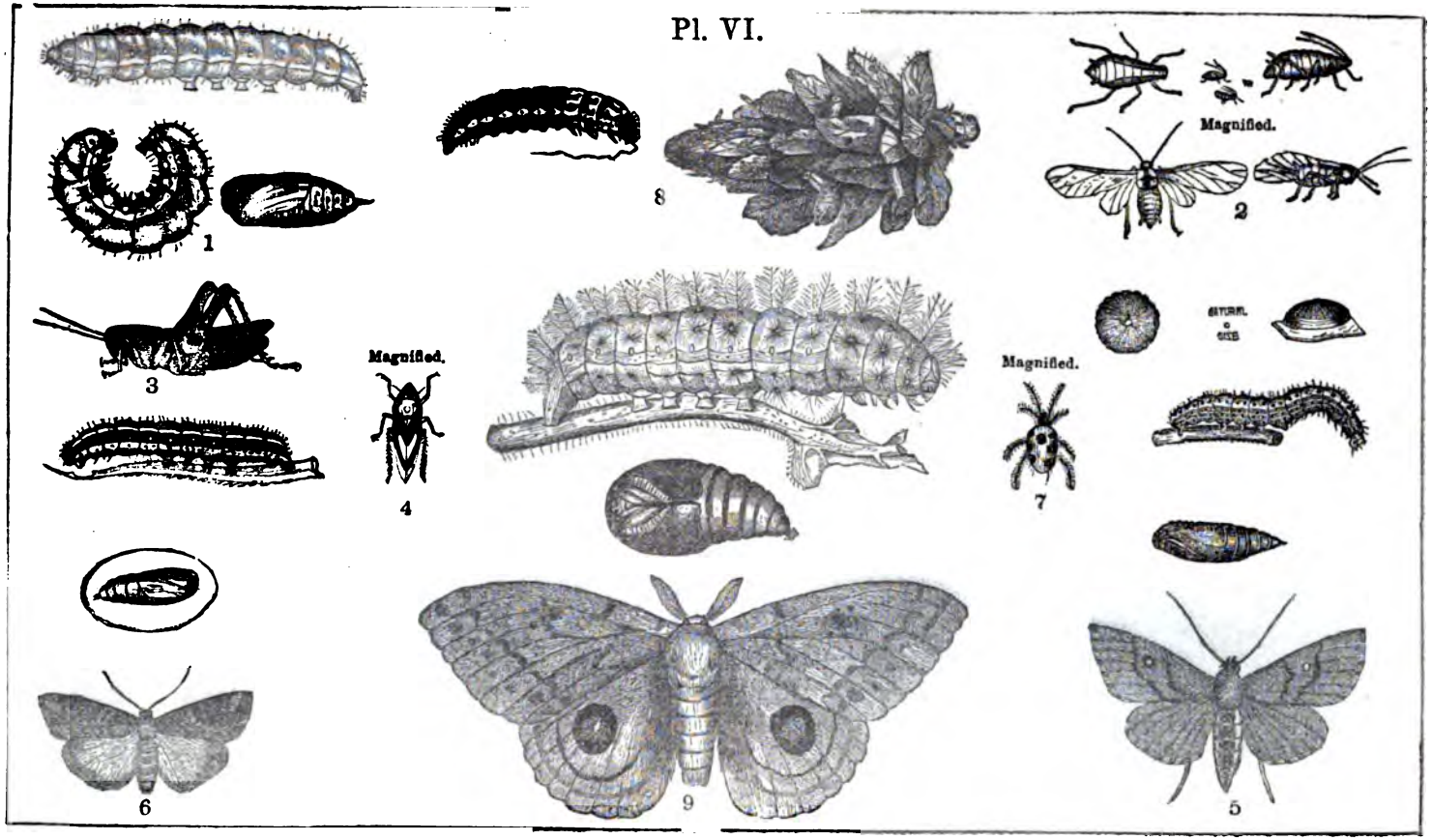
The property of Richard Peters, of Atlanta, Georgia, imported in 1849 from Turkey, in Asia, by J. B. Davis, M.D., of South Carolina. Live weight 155 pounds. Weight of yearly fleece 7 pounds.

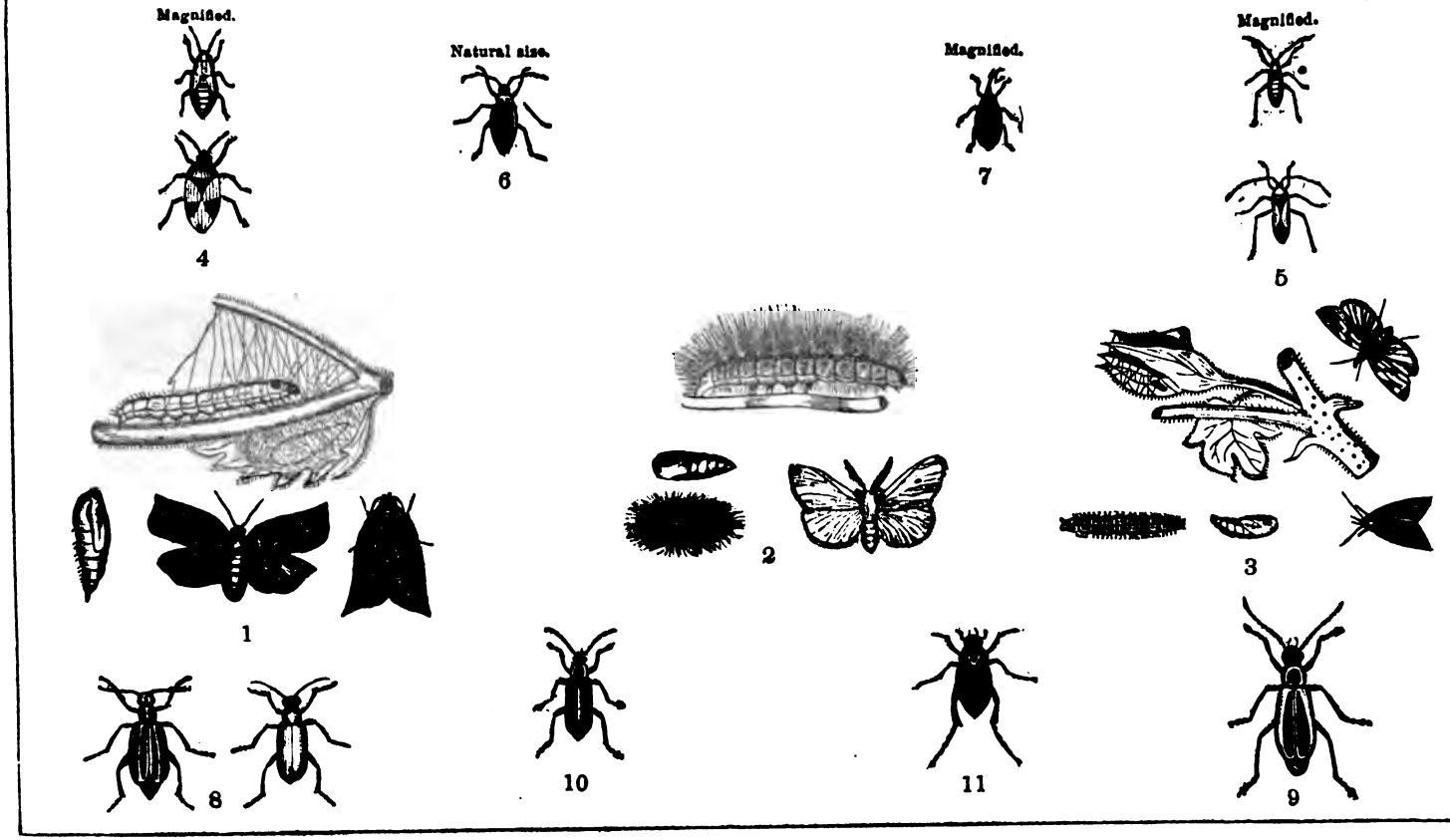
Pl. V.

FEMALE CASHMERE GOAT.

The property of Richard Peters, of Atlanta, Georgia, imported in 1849 from Turkey, in Asia, by J. B. Davis, M.D., of South Carolina. Live weight 103 pounds. Weight of yearly fleece 4 1-4 pounds.

Pl. VI.

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Pl. VIII.

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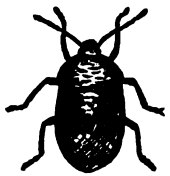

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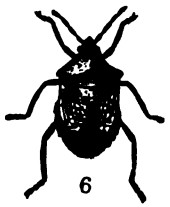

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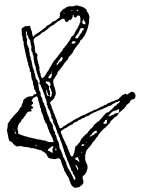

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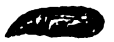

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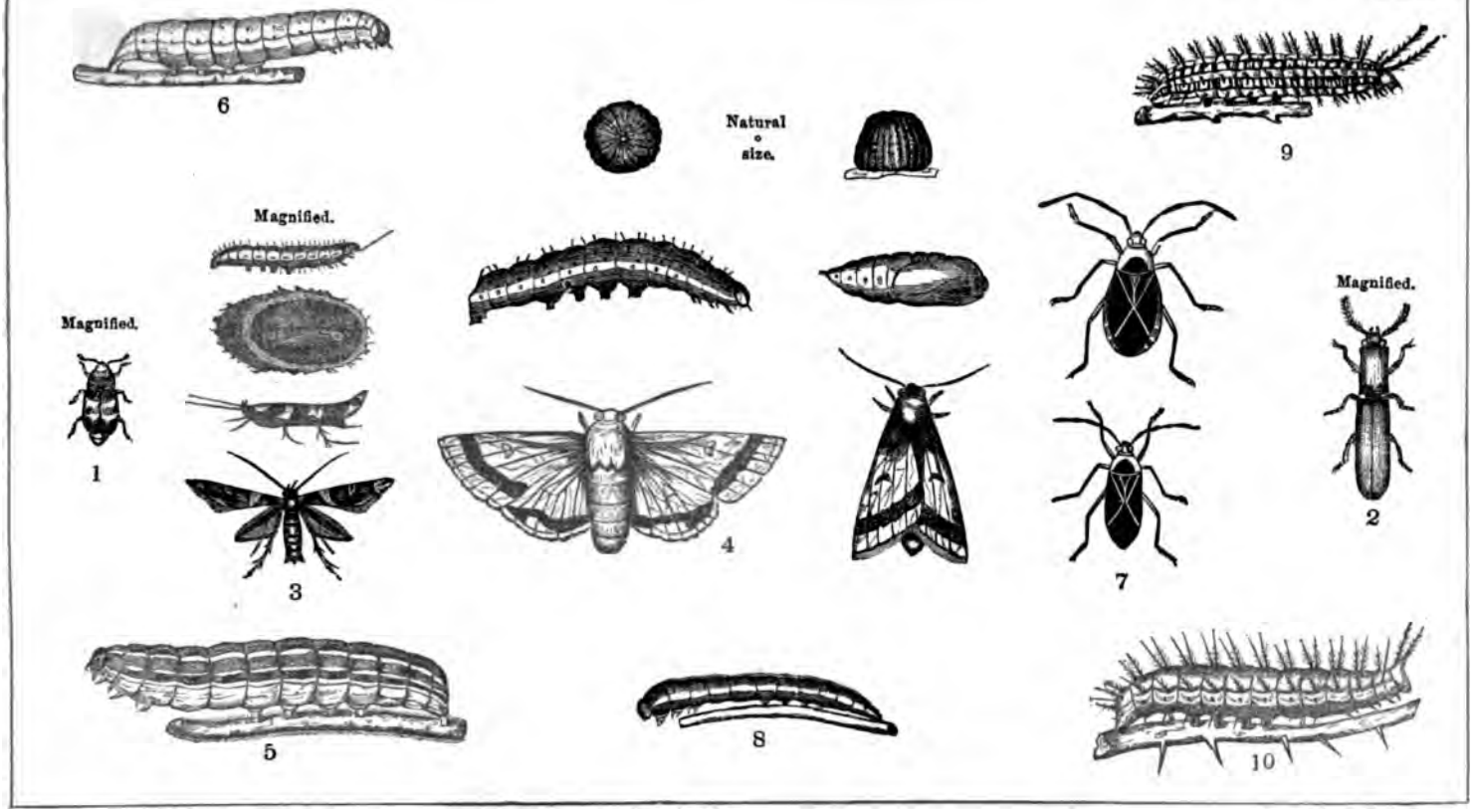
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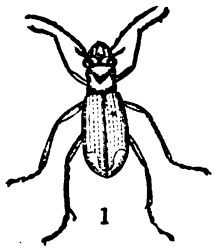
Pl.X.



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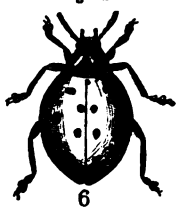

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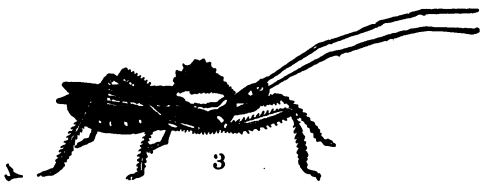

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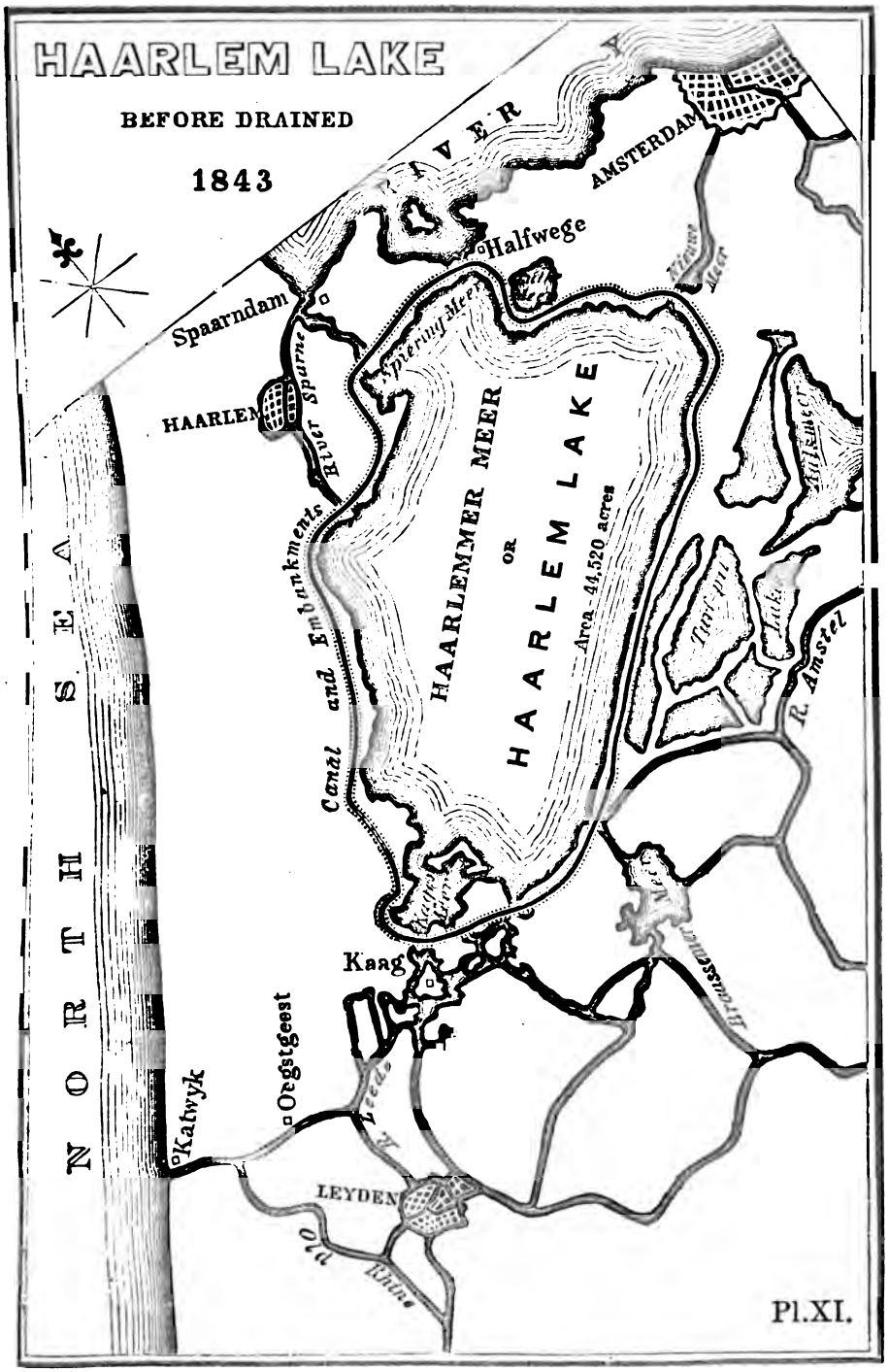
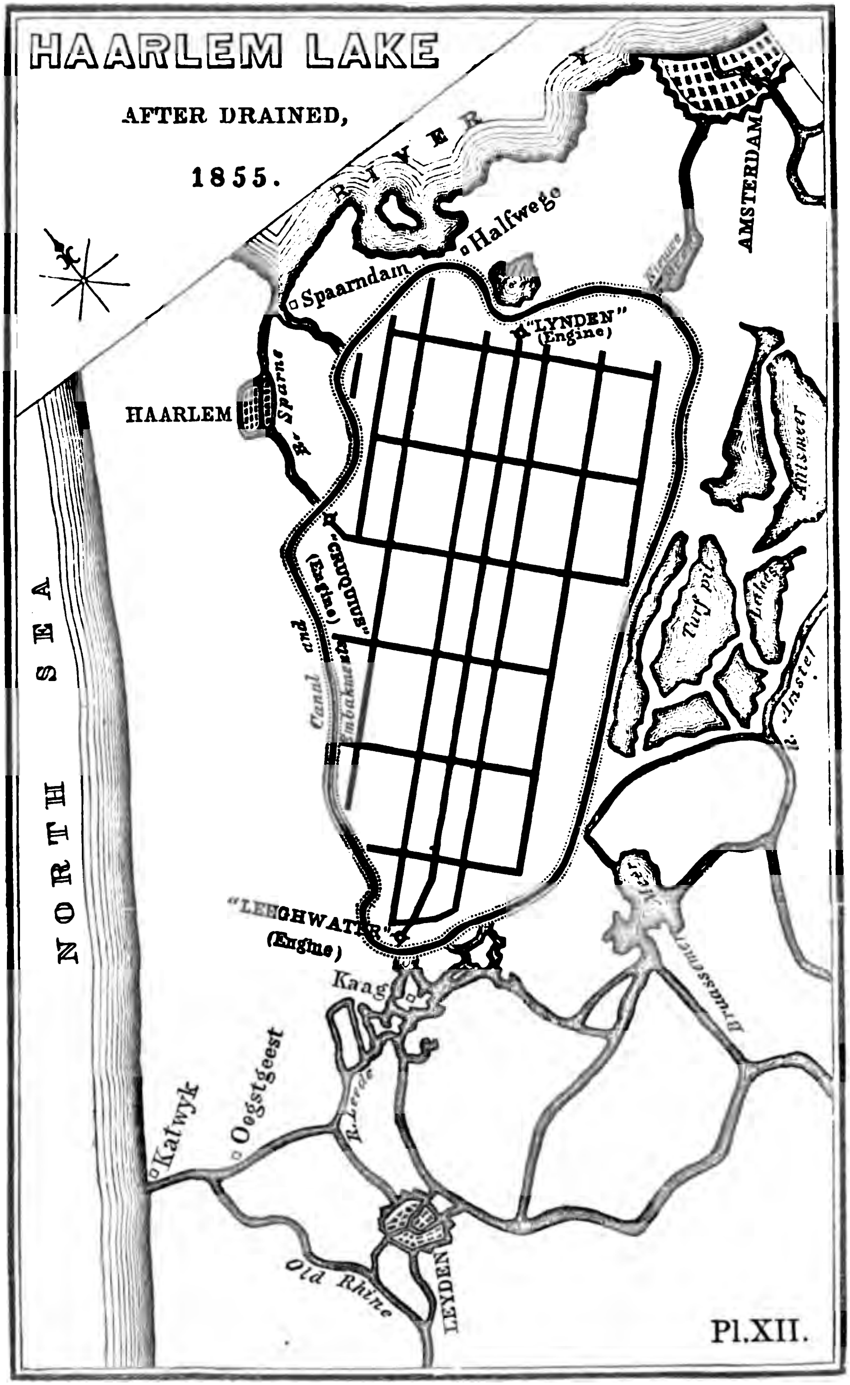

HAARLEM LAKE
BEFORE DRAINED
1843
RIVER
AMSTERDAM
Halfwege
Spaarndam
HAARLEM
River Sparne
Spiering Meer
Nieuwe Meer
HAARLEMMER MEER
OR
HAARLEM LAKE
Area - 44,520 acres
Canal and Embankments
Turf pit
Lake
R. Amstel
Kaag
Oegstgeest
Katwyk
R. Leede
LEYDEN
Old Rhine
NORTH SEA

Pl.XI.


HAARLEM LAKE
AFTER DRAINED,
1855.
RIVER Y
Halfwege
Spaarndam
AMSTERDAM
"LYNDEN" (Engine)
HAARLEM
R. Sparne
"CRUQUIUS" (Engine)
Canal and Embankment
Turf pit
Aalsmeer
R. Amstel
NORTH SEA
"LEEGHWATER" (Engine)
Kaag
Oegstgeest
Katwyk
Old Rhine
LEYDEN
Drasse Meer
Pl.XII.

34th Congress, 1st Session. } HOUSE OF REPRESENTATIVES. { Ex. Doc. No. 12.

REPORT

OF THE

COMMISSIONER OF PATENTS

FOR THE YEAR 1855

AGRICULTURE.

WASHINGTON:
CORNELIUS WENDELL, PRINTER.
1856.

REPORT

OF THE

COMMISSIONER OF PATENTS.

MAY 13, 1856.—*Resolved*, That there be printed two hundred thousand copies, extra, of the Agricultural portion of the Patent Office Report, for the use of the House, and ten thousand copies, extra, additional, for the use of the Patent Office.

UNITED STATES PATENT OFFICE,
March 31, 1856.

SIR: Agreeably to the design of Congress, as indicated by the appropriation of March 3, 1855, for the collection of agricultural statistics, and the procurement and distribution of cuttings and seeds, I have the honor to transmit herewith the Agricultural portion of my Annual Report.

The operations of the past year have been conducted in the same general manner as for the year previous. The same method of procuring and distributing seeds, roots, and cuttings has been continued; but arrangements have now been made by which the annual visit of an agent to Europe for the selection and purchase of those articles will hereafter be rendered unnecessary.

Through the large and well-known establishments of Messrs. Vilmorin-Andrieux & Co., in Paris, William Skirving, in Liverpool, Charlwood & Cummins, in London, and Ernst Von Spreckelsen & Co., at Hamburg, we expect hereafter to obtain any seeds we may need, selected with as much care and fidelity as though such an agent were despatched each year for the purpose.

The means pursued for obtaining most of our agricultural statistics, though deemed the best that could then be devised, have been far short of what was desired, and much of the information obtained has been

exceedingly loose and desultory. To render this information more complete and reliable, a project to secure the co-operation of the several State and Territorial governments has been in contemplation. Some of the States have for several years past obtained these statistics for their own purposes, with highly satisfactory results. In hopes that others might be induced to imitate this example, and that the system might be developed so far as to embrace the whole Union, the following circular was prepared and addressed to the governors and other prominent individuals of the several States and Territories:—

"WASHINGTON, *February* 29, 1856.

"SIR: An appropriation is annually made by Congress to defray the expense of obtaining statistics, and to aid in other methods, to some extent, in promoting and fostering the agricultural interests of this country. There is every reasonable probability that this course of policy will be continued hereafter.

"The results hitherto obtained, however, have been very imperfect, in consequence of a want of system, and of the means and machinery requisite for the attainment of the purpose in view; and, though the results have probably been such as to justify the expenditures heretofore made, they are insignificant in comparison with those which it is believed might be attained by the exertion of a suitable effort.

"To put in operation independent machinery on the part of the Federal government, adequate to the attainment of the object in view, would involve so many objectionable consequences, both financial and political, that no one would be willing to propose or support such a measure. But the idea has been suggested that, by the co-operation of the several State and Territorial governments, the object sought might be attained without any considerable increased expense, or the creation of additional offices.

"In some of the States, the practice has been already introduced, of annually obtaining statistics of the kinds suggested in the accompanying schedule; by making it the legal duty of the assessors to obtain these statistics at the time they are making their annual assessments of personal or real property. Such statistics will not be precisely accurate, but they will be far more reliable than estimates made in any other manner that seems as practicable, and cannot but be interesting and useful in an eminent degree. Every year will add to the accuracy of these statistics, and of the deductions drawn therefrom; and every year would demonstrate their value, in a still greater degree, as the agricultural wealth and importance of this country become

more real and more generally recognised. It cannot but be useful for the world to know, annually, the productions that are to be found in its chief granary.

"But, in order to reap the greatest possible advantage, a concert of action is indispensable. Uniformity and system in obtaining the desired information are essential to success. The importance of being able to construct one set of tables for one State, and a different set for another State, is trifling in comparison with what would result from tables which should be uniform for all those States where the same articles were produced. The entire amount of each product should be shown, as far as possible, and, if to the agricultural statistics those in relation to its commerce and mineral products can be added, the value of the results will be vastly enhanced.

"A material element of the system above shadowed forth is the establishment of a central agency, by which the information obtained in the different portions of this extended country may be collected, arranged, and published. The Agricultural branch of the Patent Office seems naturally to suggest itself for this purpose. Adequate means are there found for collecting and arranging the information obtained in the several States, and the Annual Agricultural Report furnishes a ready vehicle for disseminating this digested information over the whole country.

"Such a plan is, therefore, now suggested for your consideration. If you deem it worthy of your countenance, you are invited to take such steps as you may think proper to cause its general adoption. Especially are you desired to use your influence to cause your own local legislature to act efficiently in the matter, as far as their territorial jurisdiction extends.

"A schedule is herewith furnished, showing, in a general way, the nature of the information which is thought desirable. Other items may be added; but, in order to insure uniformity to this extent, it is suggested that nothing herein contained should be omitted, so far as the articles enumerated are produced in your State or Territory.

"It is not expected that any further than general aggregates will be returned to this Office; and, in order that such returns may be published in the Report for the then current year, they should be communicated, if possible, by the first of June, annually.

"Yours, very respectfully."

Amount and estimated value of some of the principal agricultural and mineral products, and the manufactures resulting therefrom, of the State of ———, in the year 1855.

Articles.	Quantity.	Valuation.
Apples ---- bushels		
Barley ---- do		
Beans and peas ---- do		
Boots and shoes ---- pairs		
Buckwheat ---- bushels		
Butter ---- pounds		
Cattle and calves, on hand ---- number		
Cattle and calves, slaughtered ---- do		
Cheese ---- pounds		
Clover-seed ---- do		
Coal ---- tons		
Copper ore ---- do		
Corn ---- bushels		
Cotton ---- bales or pounds		
Cotton goods ---- yards		
Flax ---- pounds		
Grapes ---- do		
Hay ---- tons		
Hemp ---- pounds		
Hogs, on hand ---- number		
Hogs, slaughtered ---- do		
Horses and mules ---- do		
Iron, pig, American ---- pounds		
Lead ---- do		
Oats ---- bushels		
Paper ---- reams or pounds		
Potatoes, common ---- bushels		
Potatoes, sweet ---- do		
Rice ---- tierces		
Rosin, tar, and pitch ---- barrels		
Rye ---- bushels		
Salt ---- pounds or bushels		
Sheep and lambs, on hand ---- number		
Sheep and lambs, slaughtered ---- do		
Sugar ---- pounds		
Timothy and other grass seeds ---- bushels		
Tobacco ---- pounds		
Wheat ---- bushels		
Whiskey ---- gallons		
Wine ---- do		
Wool ---- pounds		

It was hoped that the object sought would be deemed sufficiently important, to each of the State and Territorial governments, to induce them all to take the requisite steps for procuring and furnishing the desired information, which could be digested and sent abroad through the Annual Report of this Office, and thus the design of Congress would be attained, in as full and complete a manner, and with as little cost and trouble, as could ever have been anticipated.

From the answers received, it is regarded as probable that such

will eventually be the case; but, from the lateness of the time when the circular was issued, nothing definite could be expected until another year.

The real plan proposed has not been fully understood by some of those to whom the circulars were addressed. Many of them have supposed that the information obtained was to be communicated to this Office in its crude state, just as it was procured by the township assessors throughout the country; whereas, the design is, that all the statistics of each State, as derived from the different local officers, should be fully digested and consolidated, so that nothing but general aggregates might be furnished to this Office.

In this way, the Office would have no great burden thrown upon it. It would be serving merely as a channel through which the information, derived from so many different sources, might find its way to the world in a convenient and intelligible shape.

It has been suggested by some, that all the important items of information contemplated in this circular might be found embraced in the regular census returns, made every five or ten years; but this does not at all reach the point in view. The great object is to procure reliable information, annually, in advance of the census returns, and which may be disseminated for the use of the whole country.

If all the producers and dealers in pork could learn, with reasonable certainty, how much was slaughtered last year, and how many hogs were on hand, so as to be able to institute a comparison, in relation to similar facts, for previous years, the utility of such information would be evident. The same is true in regard to any other agricultural or mineral product.

It is hoped that these considerations will present themselves favorably to the minds of State and Territorial legislators, and that ere long a judicious, economical and well-regulated system, of this nature, may grow into existence.

About the time of preparing the foregoing circular, another was issued, and sent to consuls, missionaries, and other persons residing abroad, the object of which was to obtain information relative to the production and manufacture of cotton in foreign countries. It was believed that, as this information could be collected at small cost, its procurement would be legitimate, and would prove highly desirable. and useful.

This measure related, not merely to the present, but also to the probable future. It was intended to show the amount of cotton pro-

duced in other countries, and also their adaptation to its future production. A like course might also be advantageously pursued with regard to tobacco, and perhaps other staples of this country.

Associated with this subject are the steps which have been taken to obtain statistics of certain meteorological facts, which seem vitally connected with agriculture. The degree of heat, cold, and moisture, in the various localities, and the usual periods of their occurrence, together with their effects upon different agricultural productions, are of incalculable importance, in searching into the laws by which the successful growth of such products are regulated, and will enable us, with some degree of certainty, to judge where any given article can be profitably cultivated, and whether other countries will ever be likely to compete successfully in its culture.

We know, already, sufficient in relation to the meteorological facts involved in the question, to state that neither England, nor any portion of Northern Europe, can ever be successful competitors in the culture of Indian corn. It may, very probably, be within the reach of more extended scientific observation and research to determine whether cotton, and many other of our products, can hereafter be cultivated with success in any of the other quarters of the world.

In conjunction with the Smithsonian Institution, an effort has already been commenced by this Office to obtain such of these meteorological statistics as are most intimately connected with agriculture. A few hundred dollars were appropriated for that purpose the past year, and the expenditure is believed to have been judicious, and its continuance by this Office is contemplated.

As a supplement to these meteorological investigations, the importance of chemical analyses of soils and products naturally suggests itself. The full purpose of the former, as above set forth, cannot be carried out without a resort to the latter. Something in this direction has already been attempted. An accomplished chemist has been employed to analyse certain portions of the corn and cotton plants. This course of investigation could, doubtless, be continued with very great advantage to all our agricultural interests.

The system of inquiry relative to the classes of insects injurious or beneficial to our various agricultural products, which was commenced in 1854, has been continued through the past year, and is still in progress. A knowledge of all these insects—of their natures and habits—is the first step towards the discovery of the means necessary to check or prevent the ravages of such as are de-

structive, and may very probably end in this result. It is confidently believed that the money which has been devoted to this object has been judiciously and usefully expended, and that these investigations may be profitably continued for many years.

Measures have also been commenced to test the value and relative usefulness of the different grasses that are to be found in the country, whether of native or of foreign origin; to determine their nutritive properties, their proper modes of treatment, and the climate and soil best adapted to their profitable culture. As this is by far the most valuable product of the country, taken in the aggregate, a moderate expenditure for the purposes above intimated will probably meet with approval.

Some apology would seem to be due for the large amount of foreign statistics which are contained in this Report; but this is regarded by many quite as essential as the statistics of our own country, in order that we may know who are our competitors, and where an opening may occur for the sale of our products.

Having endeavored thus to carry out what he believed to be, in substance, the intention of Congress in making the appropriation for agricultural purposes, the undersigned now presents the results which have been attained during the past year.

All of which is respectfully submitted.

CHARLES MASON,
Commissioner.

Hon. NATHANIEL P. BANKS, Jr.,
Speaker of the House of Representatives.

REPORT

ON THE

SEEDS AND CUTTINGS RECENTLY OBTAINED BY THE PATENT OFFICE,

WITH

SUGGESTIONS AS TO THE EXPEDIENCY OF INTRODUCING OTHERS.

SIR: The benefits which have resulted to the country, and those yet in the progress of development, from the introduction or distribution of useful seeds, plants, and cuttings, obtained from distant parts of the globe, as well as from different regions of this country, have been such as to call forth the expressed gratification and general approval of the agricultural portion of the community in all sections of the Union. From the success which has thus attended the past efforts of this enterprise, we are led to hope that a rich recompense may attend our labors in future. And here permit me to repeat what was expressed on a former occasion: The time for believing that the exclusive possession of any benefit contributes solely to the privilege or prosperity of any particular country or kingdom, has gone by, and that the principles of free and universal intercourse and exchange are now conceded to constitute the surest foundation for the happiness of nations. This is so obviously true in matters of this sort, that it cannot for a moment be attended with a doubt. Hence it may be inferred that there is an ample field for exertion on the part of our general government, as well as of States and individuals, to increase our agricultural and botanical riches, and more especially those products which so conspicuously and permanently add to our useful and economical resources.

Among the seeds, cuttings, and tubers that have been introduced, or otherwise obtained, within the last three years, the culture of which has been attended with marked advantage and success, I would instance the following:—

CEREALS.

The Turkish Flint Wheat, from near Mount Olympus, in Asia, a hardy fall variety, with a dark-colored chaff, a very heavy beard, and a long, flinty, light-colored berry, will prove highly profitable to the farmer and miller, from its superior weight and the excellence of the flour it will produce. It appears to be well adapted to the soil and climate of the Middle States, and has even improved in the quality of its grain, both in regard to its color and size. It withstood the severity of the past winter, without much injury from the cold; and, from its very long and thick beard, it doubtless will be protected, in a measure, from the depredations of insects in the field, as well as from heating or moulding in the stack. The hardness of the grain, too, when dry, is a sufficient guarantee against ordinary moisture in transportation and the perforation of the weevil in the bin.

From several reliable experiments made with this wheat, in Virginia, with ordinarily good cultivation, the yield was 30 bushels to an acre. Estimating the present annual crops of wheat, grown in the Middle and Southern portions of the United States, to be 100,000,000 bushels—averaging, say 20 bushels to the acre—the increased production in those sections, if the Turkish Flint wheat alone were cultivated, and the ratio of yield as above, would be 50,000,000 bushels, which would often add to the yearly resources of a single farm $500, and of the country, at least $50,000,000.

The Improved King Philip or *Brown Corn*, the seed of which was obtained, three years ago, from an island in a lake in New Hampshire, was extensively disseminated in all the States north of New Jersey, and throughout the mountainous districts of Pennsylvania, Maryland, and Virginia. The result has been that it usually matured within the period of ninety days from the time of planting, (from the first to the middle of June,) and yielded, with good cultivation, in most cases, from 80 to 100 bushels of shelled corn to an acre. It is well adapted to high latitudes and elevated valleys and plains, where, from the shortness of summer, other varieties of corn are liable to be killed by late spring or early autumnal frosts. The quality of the grain is good, being heavy, well filled with oil, and suitable for fattening animals, or for transportation, by sea, without injury from moisture in vessels. This corn also possesses another valuable property, in being susceptible of close planting, and consequently is of a dwarfy

growth, which renders the entire stalks and blades suitable for fodder, when cured.

Estimating the present annual corn-crop of New England, New York, Michigan, Wisconsin, Minnesota, Utah, Washington, and Oregon, at 50,000,000 bushels, say 30 bushels per acre, if the variety of corn in question were solely cultivated in these States, the increased yield, allowing the product to be 50 bushels (one-half of the maximum) to the acre, would be more than 33,000,000 bushels, the value of which would be at least $20,000,000.

FORAGE PLANTS.

Among the forage products more recently introduced, and one which would seem to deserve special notice, is the "Chinese sugar-cane," (*Sorghum saccharatum*,) a new gramineous plant, of Chinese origin, but more recently from France, by the way of Natal, in South Africa. Since its introduction into this country, it has proved itself well adapted to our geographical range of Indian corn. It is of easy cultivation, being similar to that of maize or broom-corn; and, if the seeds are planted in May, in the Middle States, or still earlier at the South, two crops of fodder can be grown in a season from the same roots, irrespective of drought—the first one in June or July, to be cut before the panicles appear, which would be green and succulent, like young Indian corn, and the other, a month or two later, when or before the seed is fully matured. The amount of fodder which it will produce to the acre, with ordinary cultivation, may be safely estimated at seven tons, when green, or at least two tons per acre, when thoroughly cured. The stalks, when nearly mature, are filled with a rich saccharine juice, which may be converted into sugar, syrup, alcohol, or beer, or may be used for dyeing wool or silk a permanent red or pink; and the entire plant is devoured with avidity, either in a green or a dry state, by horses, cattle, sheep, and swine.

Considered in an utilitarian point of view, this plant, perhaps, has stronger claims on the American agriculturist than any other product that has been brought to this country since the introduction of cotton or wheat. Aside from other economical uses, its value, for feeding to animals, alone, in every section of the Union where it will thrive, cannot be surpassed by any other crop, as a greater amount of nutritious fodder cannot be obtained so cheap, on a given space, within so short a period of time.

When Cato was asked what was the best system of farming, he thrice answered, "bene pascere"; which is to be translated, "to graze

well," or to procure food for cattle—having had in view the connexion between the feeding of stock and the production of manure. Admitting the above axiom to be true, what more economical, sure and feasible mode can be adopted to restore and maintain the fertility of the exhausted lands of this country than to extend the culture of this plant for the rearing and support of a larger number of cattle, or other animals, and enriching these lands with the manure? Without wishing to present the question in an extravagant light, it may be stated that this crop is susceptible of being cultivated, within the territory of the United States, to an extent equal to that of Indian corn, say 25,000,000 acres per annum; and, estimating the average yield of dry or cured fodder to the acre at two tons, the yearly amount produced would be 50,000,000 tons, which, to keep within bounds, would be worth at least $500,000,000, besides the profits derived from the animals in milk, flesh, labor, and wool.

In addition to what is given above and in other parts of this volume, respecting the growth and culture of this plant, it may be stated that it will resist the effects of considerable frost without injury, after the panicles appear, and that those who wish to save the seeds for planting should not cultivate it in the vicinity of Dourah corn, Chocolate corn, nor broom-corn, as it hybridises or mixes freely with those plants, which would render the seeds of the product unfit for that use.

The German Millet, (Panicum germanicum,) another annual forage plant, has been introduced from France, which has proved very productive, is quick in growth, resists drought, and even flourishes well on dry soils.

TUBEROUS ROOTS.

The Chinese Yam, (Dioscorea batatas,) originally from China, but more recently from France, has been introduced, which has succeeded well in various parts of the Union, and promises to serve as an excellent substitute both for the common and sweet potato. It possesses the remarkable property of remaining sound in the earth for several years, without either deteriorating in its edible qualities or sustaining injury from frost, which adds much to its value, in being always in readiness for the kitchen, and this, too, often at times when the potato is shrivelled or otherwise impaired.

For the history and culture of this root, see the Agricultural Report of the Patent Office for 1854, and page 223 of this volume.

The Earth Almond, or *Chufa*, (Cyperus esculentus,) a small tuberous esculent, from the south of Spain, has naturalised itself to our climate

and soil, and has proved very prolific in its yield, when cultivated in the light sandy soils of the Middle and Southern States, as well as those which are rich, and bids fair to become a valuable crop for cattle and swine. It belongs to the same genus as the notorious nut-grass, (*Cyperus repens*,) but does not possess the power of spreading itself like that pest of Southern fields.

NUT-TREES, FRUITS, AND VINES.

The Persian Walnut, or *Madeira Nut*, (Juglans regia,) originally a native of Persia, or the north of China, has been somewhat extensively distributed, and appears to be well adapted to the climate of the middle and southern latitudes of the United States. A tree of the "Titmouse" or "Thin-shelled" variety (*Juglans regia tenera*,) about twenty years planted, forty-five feet in height, and fifteen inches in diameter, standing on the premises of Colonel Peter Force, in the city of Washington, is perfectly hardy, and bears yearly an abundance of excellent nuts. This is considered the most valuable of all the walnuts, as the tree begins to bear in eight or ten years from planting the seed; and the fruit is very delicate, keeps well, and is rich in oil.

In Cashmere, where the walnut is the subject of careful cultivation, there are four varieties: The "Kanak," or wild, the nut of which is diminutive, with a thick shell and scanty kernel; the "Wantu," having a large nut, with a thick and hard shell, and a deficient kernel; the "Denu," also a large nut, with a thick and rather hard shell, and a kernel large, good, and easily extracted; and the "Kaghazi," so called, from its shell being nearly as thin as paper. The latter, which may be readily broken by the hand, is the largest of all, having a kernel easily extracted, and producing an excellent oil. Its superiority is said to be attributable to its having been originally engrafted, but it is now raised from seeds, alone, and does not degenerate. The nuts, after being steeped in water, eight days, are planted in the beginning of March, and the shoot generally makes its appearance in about forty days. If reared by grafts, the process is performed when the plant is five years old. The head being cut off horizontally, at a convenient height, the stock is partially split, or opened, and the scion inserted in a similar manner to that adopted by our "cleft method," in grafting the apple or pear; but clay-mortar, worked up with rice-husks, is put round it, and kept from washing away by being enveloped in broad slips of birch-bark.

In Cashmere, the walnut-tree begins to fruit, ordinarily, when seven years old; but two or three years more elapse before it is in full bearing. The average annual number of nuts, brought to maturity on a single tree, often amounts to 25,000. It has been observed that, after a few seasons of full bearing, the trees fall off in producing fruit, and run, with great luxuriance, to leaf and branch. To this latter condition the Cashmereans apply the appellation of "must," and, to remedy the evil, cut off all the small branches, bringing the tree to the state of a pollard. The year following, shoots and leaves alone are produced, which are succeeded the next season by an abundant crop of nuts. The cut ends of the branches swell into knots, or knobs, which are somewhat unsightly in the tree, until they are concealed by the growth of the young branches and leaves. When ripe, the fruit of the Wantu walnut is retailed in the city at the rate of about two cents a hundred. The nuts of the Dunu are sold for about three cents a hundred; and of the Kaghazi, at about four cents per hundred. It is a common practice for the country people to crack the walnuts at home, and carry the kernels alone to market, where they are sold to oil-pressers, for extracting their oil. The kernels yield half their weight in oil; and the other half, which consists of oil-cake, is much valued, as food for cows in winter, when it is usually exchanged for its weight of rough rice.

About 1,150,000 pounds of walnut kernels are annually consigned to the oil-press in Cashmere, producing a large amount of oil and cake, besides a considerable quantity eaten by man, or consumed by other modes. Walnut oil, in that country, is preferred to linseed oil, for all the purposes to which the latter is applied. It is employed in cookery, and also for burning in lamps, without much clogging the wick or yielding much smoke. It is exported to Thibet, and brings a considerable profit. By ancient custom, the crop of nuts was equally divided between the government and the owner of the tree, but at present, the former takes three-fourths; yet, even under this oppression, the cultivation of this product is extended, and Cashmere, in proportion to its surface, produces a much larger quantity of nuts than any portion of the globe.

The Persian walnut attains the largest size in a deep, loamy soil, rather dry than moist; but the fruit has the best flavor, and produces the most oil, when it is grown in a limy soil, or among calcareous rocks or stones. The site on which Colonel Force's tree stands was formerly occupied by a brick-kiln. In wet-bottomed land, whatever may be the character of the surface, it will not thrive. The nuts may

be planted in a drill about six inches apart, and one-fourth of an inch below the surface, any time between the period of ripening and early spring, provided there is no danger from rats, or other vermin of the field; the nuts may also be gently pressed into the ground, even with the surface, and covered with straw or leaves; and, to afford them further protection, light poles or boards may be placed over the whole, until spring. The only attention required in their culture, the first year, is, to keep the young plants free from weeds, and, about midsummer, to shorten their tap or main roots, six or eight inches below the nuts, by inserting a spade on each side of the drills, in a slanting direction, so as to cut off their points, in order to induce them to throw out more fibres, to facilitate their transportation. Early in the spring of the second year, they may be transplanted to a distance of five or six feet apart, where they may remain until they are removed to their permanent sites. M. Bosc, in the "Nouveau Cours d'Agriculture," recommends that they should not be removed from the nursery before the stems have attained a height of five or six feet from the ground, and are five or six inches in diameter. He says, pits should be previously dug for the trees, eight feet in diameter, and three feet deep, and the soil exposed to the air some months before the time of transplanting. When the removal is performed late in autumn, all the branches may be left on till spring, when, before the sap begins to rise, the head of the tree may be entirely cut off, leaving only a main stem terminating in the stumps of the principal branches, which will be followed by the pushing out of new shoots, of great vigor, the first year.

In cases where this tree is to be grown for fruit, on dry soils or rocky situations, the nut ought to be planted where it is finally to remain, on account of the tap-root, which will thus have its full influence on the vigor and prosperity of its future growth, by descending to the sub-soil for the nourishment it could not otherwise obtain. On the contrary, when there is a moist or otherwise unfavorable sub-soil, if planted where it is finally to remain, a tile, slate, or flat stone, should be placed under the nut, at a depth of three or four inches, in order to give the tap-root a horizontal course.

When planted as orchards, the trees may be set a rod apart, an acre of which would contain one hundred and sixty in the square form, or one hundred and eighty *in quincuncem*. Estimating the product of each tree at a bushel of nuts, and supposing that it will produce that quantity in twelve or fifteen years after planting, and considering that the amount imported into this country

is valued at least at $100,000 per annum, the inducements for its culture by the farmers and planters of the Middle and Southern States would appear to be sufficiently ample for their immediate attention.

The Almond, (Amygdalus communis,) which is indigenous to Syria and Northern Africa, has become naturalised in the south of Europe, Madeira, the Azores, and the Canary Islands, and is cultivated for ornament or its fruit in the central and southern portions of the United States. When grafted upon the common plum, it often attains a height of twenty or thirty feet, with a trunk eight or ten inches in diameter; and even in the neighborhood of Paris, where the winter climate is almost as severe as that of Philadelphia, it is met with of the elevation of forty feet, and in the south of France it grows still higher.

The almond is commonly one of the first among hardy trees to display its blossoms, which generally put forth, in Barbary, in January; at Smyrna, in February; near London, in March; in Germany and New York, in the latter part of April; and at Christiana, in Norway, not till the beginning of June. The blossoms appear before the leaves; and hence they produce the finest effect when planted among evergreens. It has been observed that, though vernal frosts often destroy the germs of the fruit, they do not injure the beauty of the flowers, but even increase their splendor. An avenue of almond-trees, quite hoary with frost, in the evening, will be of a brilliant rose-color the following morning, and will often retain its beauty for more than a month; the flowers never falling off till the trees are covered with verdure. The fruit is not so attractive as that of the peach; because, instead of preserving the same delicious pulp, its pericarp shrivels as it ripens, and becomes a horny kind of husk, opening of its own accord, at the end of maturity. The kernel of some varieties of the almond, however, is not defended by so thick a shell as that of the peach and nectarine; for it is often so tender that the nuts break when shaken together. The chief distinction between these fruits is, that the almond has a stone, covered with a coriaceous, dry, hairy covering, while those of the peach and nectarine are developed in a rich, juicy pulp, surrounded by a smooth or downy skin.

In a wild state, the almond is sometimes found with bitter kernels, and at other times sweet, in a similar manner to the Grammont oak, (*Quercus hispanica*,) which, in Spain, generally bears sweet, edible acorns, but sometimes produces only such as are bitter. The two varieties the most valuable for cultivation, are the "sweet-kernelled"

almond (Amandier à petits fruits, or Amandes douces, of the French,) and the "soft-shelled" almond, (Amandier à coque tendre, or Amande à coque molle, of France.) The shell of the former is hard, but the kernel is sweet-flavored. It is cultivated in the south of Europe, being generally propagated by grafting, standard high, on the bitter almond, or on strong-growing seedling almond stocks, in order to insure the sweetness of its fruit. The latter is characterised by the softness or fragility of its shell, as well as by the sweet flavor of its kernel, and is the variety recently introduced and distributed by this Office.

The almond does not prosper, unless the soil be dry, sandy, or calcareous, and of considerable depth; but all the varieties will succeed well in a free soil, that is not too moist, when grafted or inoculated on stocks of the common plum. The situation should be sheltered, on account of the liability of the branches to be broken off by high winds. As it sends down a tap-root, exceeding two feet in length the first season, it has been found that such a tree, when taken up, has few fibres, and, consequently, but little chance of growing. From this circumstance, originated the practice of germinating the nuts in boxes of earth before sowing them, and pinching off the point of the radicles when about an inch in length, which causes it to throw out numerous horizontal roots. This mode of germinating the nuts also insures plants to the nurseryman the first season after sowing, whereas, when this is not done, the seeds often lie dormant in the ground two years. The almond requires but little pruning, except when fruit of a large size is desired, or the duration of the tree is wished to be prolonged.

The advantages of this tree may be briefly summed up in the following words: It prospers upon indifferent soil; requires but little care in its cultivation; is beautiful as an ornamental tree; useful as a shade-tree; and profitable in its production of a much-desired fruit, yielding, in its bearing years, about 20 pounds to the tree, which, at 15 cents a pound, would amount to at least $500 to an acre. The amount of almonds annually imported into the United States is believed to be valued at more than $250,000.

The Cork-Oak, (Quercus suber,) an evergreen tree, indigenous to the south of Europe and Northern Africa, which furnishes the well-known article, cork, in sufficient quantities for commerce. It is adapted to the soil and climate of many parts of the Middle and Southern States, and, aside from its desirableness as a beautiful shade-tree, will prove a necessary auxiliary to the future wine-culture of

this country, as well as for the supply of the increasing demand for cork for other purposes.

In the regions where this tree is indigenous, it usually grows to a height of twenty or thirty feet. It was introduced into England about the year 1699, by acorns brought from France or Spain, and still exists there in various collections, having attained, in some instances, a diameter of two or three feet. A tree of this species also stands on the estate of Samerstown, near Cork, in Ireland, with a diameter of at least three feet at a yard above the ground.

The cork-tree bears a considerable resemblance to our live-oak of the Southern States, but varies exceedingly in the magnitude, form, and margin of its leaves, as well as in the size of its acorns, which, M. Bosc alleges, may be eaten as human food in cases of necessity, especially when roasted. Swine are excessively fond of them, upon which they fatten well, acquiring a firm and savory bacon or lard. The outer bark, the great thickness and elasticity of which is owing to an extraordinary development of the cellular tissue, forms the cork; and, after the tree is full grown, cracks and separates from the trunk and larger branches of its own accord. The inner bark remains attached to the tree, but, when removed in its young state, is only fit for tanning. But the outer bark, that separates naturally from the trunk, is regarded as of little value, compared with that which is removed by art; and the reason doubtless is, that, in the latter case, it has not arrived at that rigid, contracted and fractured state, which is the natural consequence of its dropping from the tree. When this oak has attained the age of fifteen years, according to Du Hamel, or twenty years, according to Bosc, the bark is removed for the first time; but this first bark is found to be cracked, and full of woody portions and cells, and hence it is fit only for fuel, or perhaps for tanning. The second disbarking takes place in eight or ten years, when the cork is sold to fishermen for buoying up their nets, and to others for inferior uses. But, in eight or ten years more, the tree yields cork of good quality, and so continues to do until it is from two to three centuries old, the cork improving in quality throughout the whole period.

In view of the ease with which the cork-oak can be propagated in the central and maritime parts of the Middle, Atlantic and Southern States, and, perhaps, on the prairies of Texas, Louisiana, Arkansas, Missouri, and Illinois, and the general desire for diversifying the landscape of those States with beautiful, long-lived, umbrageous trees, the comparatively long time which is necessary for its growth before

much, if any, profit can be realised, should not deter the prudent or sagacious husbandman from extending its culture. Considering it in a politic as well as in an economical sense, seasonable measures should be taken to form plantations of this tree, sufficient for the future supply of cork, particularly for the increasing demands for that material which are likely to arise from the culture of the vine. Again, were non-intercourse to occur between this country and the Old World, which, from some political commotion, doubtless one day or other will take place, the sources from which it is obtained would be cut off, and, in a short time after, our supply would be exhausted, and we would be without a substitute, unless provided against such an exigency by the means herein proposed. As a further argument in showing the importance of fostering this branch of rural economy, it may be stated, that the amount of cork which is yearly imported into the United States, is valued at more than $284,000.

Among the cuttings of *fruit-trees* which have been introduced, may be mentioned the "Prune d'Agen" and the "Prune Sainte Catharine," from France. They have both been extensively distributed and grafted on the common plum-tree in all the States north of Pennsylvania, itself included, and on the mountainous districts of Maryland and of Virginia. From the success which has attended this experiment, there is much reason to believe that there will soon be produced from these, and other varieties from Europe, a sufficient quantity of dried prunes, in those regions, to supply the wants of the whole Union. The amount of this class of fruit annually imported into this country, according to official returns, is valued at $64,568.

A quantity of the cuttings of the "Raisin" and "Currant" grape-vines (Vigne chevelés and Vigne corinth) were also imported from France, the varieties from which are made the "Ascalon," "Sultana" or stoneless raisin, and the "Zante" or "Corinth" currant. They were principally distributed in the central latitudes of the United States, and, as far as heard from, withstood the severity of the climate, last winter, and bid fair to do well.

MEDICINAL PLANTS.

A quantity of the roots of "Liquorice," (*Glycyrrhiza glabra*,) a somewhat tender perennial, much cultivated in the south of Europe, and, to some extent, in England, was introduced, and has thus far answered the expectations of the experimenters in several of the Middle and Southern States. From the increasing demands for this root in pharmacy, or medicinal preparations of various kinds, there is

no reason why its culture could not be profitably extended in most localities where it will thrive. The amount annually imported in a crude and manufactured state is valued at about $300,000.

For the culture and preparation of this plant see Agricultural Report of the Patent Office for 1854, page 358.

A variety of the "Common" or "Opium Poppy," (*Papaver somniferum*,) indigenous to the warm and temperate parts of Europe and Asia, from Portugal to Japan, and especially cultivated in China, India, Turkey, Egypt, and in the Morea, has been introduced, and has proved itself susceptible of easy cultivation on very rich soils, and is well adapted to the climate of the Middle and Southern States. The flowers of the "White Poppy," (*Papaver s. alba*,) the variety with which the experiment was made, may be either entirely white or red, or may be fringed with purple, rose, or lilac, variegated and edged with the same colors, but never occur blue nor yellow, nor mixed with these colors, each petal being generally marked at the bottom with a black or purple spot. The seeds are black in the plants having purple flowers, and light-colored in those which are white; although the seeds of the latter, when of spontaneous growth, are sometimes black. The largest heads, which are employed for medical or domestic use, are obtained from the single-flowered kind, not only for the purpose of extracting opium, but also on account of the bland, esculent oil that is expressed from the seeds, which are simply emulsive, and contain none of the narcotic principle. For the latter purpose, if no other, its culture in this country is worthy of attention.

With regard to the cultivation of this plant, with the view of obtaining opium, there can be but little doubt that our clear sky, fervid summer sun, and heavy dews would greatly favor the production of this article; but how far these circumstances, in connexion with American ingenuity in devising improved methods for its extraction, would allow us to compete with the cheapness of labor in the East, can only be determined by actual trial. Certainly it is an object worthy of public encouragement, as the annual amount of opium imported into the United States is valued at upwards of $407,000, a considerable portion of which might be saved, and thereby add to our resources. Besides, if we were to raise a surplus, it could be sent to China in exchange for tea. The successful cultivation of the plant, however, requires the provision of good soil, appropriate manure, and careful management. The strength of the juice, according to Dr. Butler, of British India, depends much upon the quantity of moisture of the climate. A deficiency even of dew prevents the proper flow of

the peculiar, narcotic, milky juice, which abounds in almost every part of the plant, while an excess, besides washing off this milk, causes additional mischief, by separating the soluble from the insoluble parts of this drug. This not only deteriorates its quality, but increases the quantity of moisture, which must afterwards be got rid of.

The history of the poppy, as well as that of opium, its inspissated juice, are but imperfectly known. The oldest notices of this plant are found in the works of the early Greek physicians, in which mention is also made of the juice; but opium does not appear to have been so generally employed as in modern times, or the notices respecting it would have been more numerous and clear.

In the manufacture of opium, in Persia or India, the juice is partially extracted, together with a considerable quantity of mucilage, by decotion. The liquor is strongly pressed out, suffered to settle, clarified with the white of eggs, and evaporated to a due consistence, yielding from one-sixth to a fifth of the weight of the heads of extract, which possesses the virtues of opium in a very inferior degree, and is often employed to adulterate the genuine opium. The heads of the poppies are gathered as they ripen; and as this happens at different periods, there are usually three or four gatherings in a year.

The milky juice of the poppy, in its more perfect state, which is the case only in warm climates, is extracted by incisions made in the capsules, and simply evaporated into the consistency in which it is known in commerce under the name of opium. In Turkey, the plants, during their growth, are carefully watered and manured, if necessary; the watering being more profuse as the period of flowering approaches, and until the heads are half grown, when the operation is discontinued, and the collection of the opium commences. At sunset, longitudinal incisions are made upon each half-ripe capsule, not sufficiently deep to penetrate the internal cavity. The night dews favor the exudation of the juice, which is collected in the morning, by scraping it from the wounds with a small iron scoop, and depositing the whole in an earthen pot, where it is worked in the sunshine with a wooden spatula, until it acquires a considerable degree of thickness. It is then formed into cakes by the hands, and placed in earthen pans to be further exsiccated, when it is covered with the leaves of the poppy, tobacco, or of some other plant.

Two kinds of this article are found in commerce, distinguished by the names of "Turkey" and "East India" opium. The former comes in solid, compact, and translucent masses, of moderate specific gravity, possessing a considerable degree of tenacity, yet somewhat

brittle. When half cut through, the section is dense, a little shining, of a dark-brown color, becoming softer by the warmth of the fingers, in handling, and is reduced with difficulty to powder, unless done when it is cold, and after having been long dried in small pieces. The best article comes in flat pieces; and, besides the large leaves in which they are enveloped, they are usually covered with the reddish capsules of a species of rumex, used in packing. The roundish masses of opium, which have none of these capsules adhering to them, are regarded as inferior in quality. It is also inferior when it is friable or soft. The East India opium has usually much less consistence than the Turkish, being sometimes not thicker than tar, and always ductile. Its color is much darker; its taste more nauseous, and less bitter; and its smell rather empyreumatic. When imported, it is somewhat cheaper than the Turkish opium, and supposed to be of only half its strength.

Among other *products* which appear to be worthy of introduction or extension, and likely to succeed in some portion of our territory, I would suggest the following:—

PLANTS WHICH MAY BE CULTIVATED FOR MEDICINE, CONDIMENTS, OR HUMAN FOOD.

The Vanilla Plant (Vanilla planifolia) is a native of the island of St. Domingo, where it climbs to the tops of the highest trees; and is somewhat extensively cultivated in Mexico, in the vicinity of Vera Cruz. From the great demand, and the high price which it brings in the United States, it doubtless could be grown to advantage in some parts of the South, with a very little protection during the colder months of the year, and perhaps in hot-houses at the North.

The amount of vanilla imported and consumed in this country, principally for flavoring cake, ice-cream, &c., is believed to exceed 5,000 pounds, valued at from $20 to $30 a pound, or $125,000 a year. The Mexicans have three classes of these beans, which they distinguish in commerce by the names, *pompona*, *ley*, and *simarona*.

When the fruit begins to turn yellow, it is gathered and fermented in heaps, in the same manner as is practised with the pods of the cocoa (theobroma), then spread in the sun to dry, and, when about half cured, pressed flat with the hand, and, rubbed over with the oil of Palma-Chrisli, or of the cocoa; it is then exposed again to the sun to dry, the oiling repeated, and the pods covered with the leaves of a reed to preserve them. The pods, as they occur in commerce, are of a dark-brown color, about six inches long, and scarcely an inch

broad; they are wrinkled on the outside, and filled with numerous black seeds, of an agreeable smell, resembling grains of sand.

This vine shoots out roots at every joint, like the ivy, and may either be grown on a piece of a rotten trunk of a tree, or planted in a pot of rotten tan-bark, mixed with rubbish, and the stem trained against any surface that will admit its roots. Like all the other plants of the family to which it belongs, the vanilla requires but little water. It should not be exposed in a continued temperature much, if any, below 60° F.

The Ginger Plant, (Zingiber officinale,) a native of the East Indies, and of various parts of Asia, and extensively cultivated in the West Indies, and other warm parts of America, doubtless could be grown with advantage in various parts of the South. The amount of ginger annually imported into the United States is valued at upwards of $60,000.

For the cultivation of this plant, see the Agricultural Report of the Patent Office for 1854, page 354.

Iceland Moss, (Cetraria islandica,) a species of lichen, a native of the mountainous heaths and woods in the Alpine parts of Scotland, and of the Asturias, in Spain, as well as in Iceland and the north of Germany. It grows to a height of only two or three inches, and has rather a rugged, bushy appearance, and doubtless would thrive, and perhaps with profit, in the northern parts of the United States, particularly in Minnesota, Wisconsin, Michigan, Northern New York, Vermont, New Hampshire, and Maine.

In Iceland and Lapland, this plant is used as an article of diet, being boiled in broth or milk, after being freed from its bitterness by repeated maceration in water; or dried and made into bread. The dried plant differs but little from its appearance in a recent state. Medicinally, it is tonic and demulcent. The decoction, as ordered in the pharmacopœias, is so bitter as to prevent many persons from taking it; and when deprived of its disagreeable taste, it can only be viewed as a demulcent, and is hardly equal in its effects to linseed, quince-seed, and marsh-mallows. It certainly does not cure phthisis pulmonalis; but in the last stage of that disease, when solid food is oppressive, and the diarrhœa appears to be kept up by the acrid contents of the stomach and bowels, it has appeared to check the latter, and to impart both vigor and nourishment to the digestive organs.

The Florentine Iris, or *Orris-root Plant*, (Iris florentina,) a perennial, native of Carniola, and common in the gardens of Europe,

the root of which is remarkable for communicating an oder like that of violets, and produces the orris of the shops. The flowers, which put forth in spring, are noted for the graceful curve of their petals, as well as for the brilliancy of their hues. It has a thick, tuberous, creeping stem, usually called its root, which, externally, is brown and yellowish, is white within, and sends out numerous fibres—the true roots—from the lower part. When these are pared off, the stem appears full of round spots.

Independent of the value which would be derived from the roots of this plant, it would be highly desirable to cultivate it for the purposes of ornament, in all parts of the country where it would thrive.

The Palmated Rhubarb (Rheum palmatum,) is a perennial, native of Russia and some parts of Asia, whence the dried root is imported into this country for medicinal purposes. Large quantities of the roots are also annually collected for exportation in the Chinese provinces, within the lofty range of the Himalayas. The best is that which comes by the way of Russia, as greater care is taken in the selection; and, on its arrival at Kiachta, within the Russian frontiers, the roots are all carefully examined, and the damaged pieces destroyed. This is the fine article of the shops, improperly called "Turkey" rhubarb. That of the best quality occurs in small pieces, with a hole in the middle of each, made in the fresh root, to facilitate the operation of drying. The color is a lively yellow, streaked with white and red. Its texture is dense, and, when reduced to powder, it is entirely yellow.

The Chinese rhubarb, called by the natives *Ta Hroangor Hai-houng*, is cultivated chiefly in the province of Chersee. As imported, it is known by the name of "East Indian" rhubarb, and comes in larger masses, more compact and hard, heavier, less friable, and not so fine in the grain as the other, and having less of an aromatic flavor.

This species has been introduced into England, where it has been extensively cultivated; and there is little doubt, therefore, of its proving perfectly hardy in many parts of our own country. Large quantities are annually imported, the cost of which might be saved if its culture were successfully prosecuted here, and we might thus add to our productive resources.

In the middle and cooler parts of the United States, the seeds may be sown in March, in a gentle hot-bed, and, when the roots are about an eighth of an inch in diameter, they may be carefully drawn up, preserving the tap-root, and planted in a fine, rich, and deep soil—but

not too much so, lest the roots should be too fibrous—at the distance of eight feet apart, a wet or cloudy day being preferred for this operation. Should the weather prove dry, they must be watered. When the plants are once in a growing state, all further care and trouble are at an end, except that of keeping them free from weeds. It may be stated, however, that they do not necessarily require a hot-bed to make them vegetate; but, if sown in the natural ground in the Middle or Southern States, in the spring, when the weather is open, they will soon come up and thrive well. One of the greatest difficulties, in pursuing this method, consists in carrying the plants through their first season. If the weather be hot and dry, they must be shaded, and at all events continually watered; yet not too freely, as in most seasons the weather can scarcely be too dry, after the plants have been well set. Indeed, more evil is to be apprehended from a superabundance of moisture than from an actual want of it. In the month of August, or before, the seed-stalks should be cut off, which ought always to be done on the withering of the radical leaves; and the crowns of the plants should then be covered with mould, in the form of a hillock.

The largest specimens of this drug have generally been allowed to grow six or seven years; the roots are then very large, sometimes weighing from 30 to 50 pounds. The Chinese take up their rhubarb in winter. Pallas says that the Tartars take up theirs in April and May; but Forster, in his "History of Voyages in the North," with more reason, affirms that the roots are dug up in winter, because they then contain the entire juice and virtue of the plant, as those taken up in summer are of a light, spongy texture, and unfit for use.

In Tartary, after being thoroughly cleansed, and the small radicles cut off, the roots are cut transversely into pieces of a moderate size; these are then placed on long tables, or boards, and turned three or four times a day, in order that the yellow, viscid juice may incorporate with the substance of the root. If this juice be suffered to run out, the roots become light, and of but little value; and if they are not cut within five or six days after they are dug up, they become soft, and rapidly decay. Four or five days after they are cut, holes are made through them, and they are hung up to dry, exposed to the air and wind, but sheltered from the sun. Thus, in about two months, the roots are completely cured. The loss of weight in drying is very considerable, seven parts, in weight, of the green root, yielding only one part of that which is perfectly dry. The Chinese method is somewhat different. They peel the roots, cut them into slices, and dry them on stone slabs, under which fires are kindled; but, as this process is not

sufficient to dry them perfectly, they make a hole through each of the pieces, and suspend them on strings—some say exposed to the sun, while others assert that they are hung in the shade.

The Castor-oil Plant, (Ricinus communis,) known in almost every part of the East and West Indies, South America, China, and the countries and islands of the Mediterranean, under the name of "Palma-Christi," has proved itself well adapted to the soil and climate of our Middle and Southern States; and were its culture extended for the manufacture of castor-oil, there is no doubt that it would be profitable, under improved methods of extracting it; and we should no longer be dependent on other nations for a supply. At present, we annually import an amount of this article exceeding in value $30,000.

Although an annual, herbaceous plant, in the gardens of the cooler parts of Europe and the United States, within the tropics and the warm climates adjacent thereto, the Palma-Christi becomes a tree of several years' standing, often having a woody trunk, of the size of a man's body, and fifteen or twenty feet high.

This plant thrives best on a light, sandy loam, although it may be cultivated with success in almost any soil tolerably fertile, or in any climate and situation where Indian corn will thrive. In the cooler parts of the Union, it may be planted in hills, two feet by three feet apart, two seeds in a place, as early in the spring as the warmth of the ground and the season will admit; but in the South, where the season is longer, and the plant assumes the character of a tree, the hills should be six or seven feet apart in one direction, and three and a half feet in the other, receiving only one seed to a hill, covered to the depth of two inches. The culture is so simple that it only requires to keep the plants free from weeds, with a small flat hill to each. The only difficulty to contend with is, that in saving or harvesting the beans, the outward coats, as they become dry and elastic, fly off the plants to a considerable distance, causing the seeds to drop to the ground. In order to prevent this, it has been recommended to cut off the branches from the plants, as soon as the pods begin to explode, and spread them on the floor of a close room; and, after the beans and their shells have parted, to separate the husks from the seeds with a fanning-mill, as with wheat, or try the common riddle and a draught of air.

The seeds of this plant furnish the well-known medicine, castor-oil, which is obtained both by decoction and expression. The former method is performed by freeing the seeds from their husks, which are gathered, upon their turning brown and when beginning to burst open, are first bruised in a mortar, afterwards tied up in a linen bag, and

then thrown into a large pot, with a sufficient quantity of water, and boiled until the oil has risen to the surface, when it is carefully skimmed off, strained, and preserved for use. In extensive operations, a mill should be provided, moved by the agency of animal power, water, or steam, for bruising the seeds; and the other apparatus used in obtaining the oil should be of appropriate dimensions. The oil thus obtained, however, has the disadvantage of becoming rancid sooner than that procured by expression. The best mode, therefore, is to subject the seeds to a powerful hydraulic press, in a similar manner to that in which oil is extracted from almonds and cotton-seeds. The seeds yield about one-fourth of their weight in oil.

The Assafœtida Plant (Ferula assafœtida) is a native of the South of Persia, growing on the mountains in the provinces of Chorasaan and Laar, where it is called *Hingisch*. The gum resin, known in commerce under the name of "assafœtida," is the concrete juice of this plant, which is said to vary according to the soil and situation, not only in the shape of the leaves, but in the nauseous quality of the juice with which it is impregnated, sometimes occurring so mild as to be eaten by goats. The root is perennial, tapering, and ponderous, attains the size of a man's arm or leg, and is covered with a blackish colored bark, beset near the top with numerous strong, rigid fibres; the internal substance is white and fleshy, and abounds in a thick, fœtid, milky juice. The stem is simple, erect, straight, round, smooth, striated, herbaceous, six or seven inches in circumference at the base, and rises to a height of seven or eight feet.

When the plants are about four years old, the roots are sufficiently vigorous to yield the gum, and it is collected at the season when the leaves begin to decay. The oldest and most vigorous plants are selected, the earth from the upper part of the root of each is cleared away, and the stem and leaves twisted off. In this state, it is left for forty days, being previously screened from the sun by covering it over with decayed leaves. At the expiration of this time, the covering is removed, the top of the root cut off transversely, and left for forty-eight hours for the juice to exude, when it is scraped off by a proper instrument, as opium is from the capsule of the poppy, and exposed to the sun, to harden. This operation is repeated three times, after which the root is again covered up, and suffered to remain for eight or ten days, when it is again uncovered and another transverse section is made as before. In this way, the assafœtida is collected eight times, when the root becomes exhausted of its juice, and soon after dies.

From the character of the climate in which this plant naturally grows, there can be but little doubt that it could be successfully cultivated in the mountainous parts of the Southern States, and probably furnish the whole country with the requisite supply.

The Lesser or Malabar Cardamom, (Alpina vel matonia,) the seeds of which are imported in considerable quantities, and valued for their pungent taste, is cultivated in plots, either level or gently sloping surfaces on the highest range of the Ghaûts, between latitude 11° and 12° 30′ N., after passing the first declivity from their base.

The cardamom plots, or farms, vary in size and shape, being from fifty to sixty yards in diameter, usually oblong or oval, but sometimes irregularly rounded. The variety in these respects is chiefly owing to the convenience of the standard or permanent shade-trees. Those with lofty, straight stems, extensive heads, and particularly those which have nearly attained their full growth, and are known to be long-lived, are preferred for this purpose, and are left standing at a distance of fifteen to twenty yards from each other.

On account of the prevailing dry weather, the months of February and March are selected by the cultivators as the proper time for commencing their labors, and planting the seeds, the first part of which is occupied in cutting down the large and small trees, leaving of the former, standing nearly at equal distances, such stately individuals as afford that degree of perpendicular shade which experience has taught them to be most favorable for their future hopes. The grass and weeds are then cleared away, and the ground disencumbered of the roots of the brush-wood; the larger trees being suffered to lie where they fell; and the shrubs, roots, and grass are piled up into small heaps, where, by their spontaneous decomposition, they fertilise the space they cover. As the cultivated plant does not flower till it is four years old, no further labor is bestowed upon the plots before that time has expired. At the revolution of the fourth rainy season, and towards its close, the farmers look for a crop, and their hopes are rarely disappointed. This first effort of Nature is generally feeble, the yield of seeds being not more than half of that which is obtained the following year, and only one-fourth what it is after the sixth rain, at which period the plant has reached the acme of its prolific vigor.

In India, the seeds of this plant are highly prized as an agreeable condiment, and, as such, their use is so universal, that they are regarded as a necessary of life by most of the natives of Asia. In fact, their general use in those regions renders the plant a very important and profitable object of culture. How far its adoption could be made

applicable to the soil, climate, exposure, and economy of some of our Southern States, can only be determined by trial.

The Sinhara, or Water Nut, (Trapa?) is a native of the Cashmere, but grows abundantly in the lakes near the capital, especially in the Wurler lake, and yields an average return of 10,000,000 pounds of nuts a year. They are scooped up from the bottom of the lake in small nets, and afford employment to the fishermen for several months.

These nuts constitute almost the only food of at least 30,000 persons for five months in the year. When extracted from the shell, they are eaten raw, boiled, roasted, fried, or dressed in various ways, after being reduced to flour. The most common preparation is to boil the flour in water, so as to form a kind of gruel, which, though insipid, is very nutritive.

The Lotus (Nymphæ lotus) is also a native of the lakes of the Cashmere, and its stems serve as another article of food. In autumn, after the plate of the leaf has begun to decay, the stem has arrived at maturity, and being boiled till tender, furnishes a wholesome, nutritious diet, which is said to support 5,000 persons in the city for nearly eight months in the year.

This plant, as well as the preceding, probably would succeed well in the muddy bottoms of the coves, creeks, and sloughs of our lakes and streams; and, if not relished as human food, doubtless its products would serve to nourish animals.

FORAGE PLANTS.

The Guinea Grass, (Panicum jumentorium,) as its name implies, is a native of Guinea, and was brought to the island of Jamaica in 1774, under the following circumstances: A cage of African birds had been presented to Chief Justice Ellis, with which was sent a small bag of their native food, the wild grass-seed of the coast of Guinea. The birds died, and the seeds were carelessly thrown into a hedge, when they quickly grew and spread; and from the eagerness of the cattle to reach it, attention was called to its vegetation. It has since become one of the most valuable productions of the West Indies, and, doubtless, could be cultivated with advantage in the warmer parts of the South.

Guinea grass, in Jamaica, is best planted in the spring, because it takes four months before the seed ripen, and the stalks acquire sufficient substance to form plants from the joints, similar to those of

sugar-cane. The soil should be dry, and entirely free from stagnant water, which would immediately scald and rot the roots. In planting, dig holes four feet apart, each way, to the depth of a hoe, say six inches, and insert a small piece of grass-root, taken from a large plant; open the stalks of each torn piece of root, and place them in the holes, covering their centres with earth, thus dividing the stalks. Indian corn may be planted between the rows, one hoeing of which will be sufficient to carry forward the grass, and the expense will be covered by the corn. In four months, the grass will be seeded and the stalks ripe, when horses or cattle may be turned into the field to feed, and trample the joints into the ground. If the weather be wet, which is usually the case in the months of September and October, the young joints, thus trodden, will grow, making the field of grass a perfect mass of verdure, keeping down all the vegetation, unless, perhaps, that of quick-growing bushes, or the sprouts which spring up from the stumps of trees, that have not been eradicated or killed by burning, in the preparation of the land.

This grass may be grazed every six or eight weeks, if carefully shut off in the intervening time, and the stock never allowed to eat it too low. The stubble is usually left at least a foot high. In lands which have been in sugar-cane or other cultivation, where the stumps have been eradicated, the grass can be planted with a plough, two hands following the furrow, and laying down the roots in such a manner as will allow the plough to cover them with the succeeding furrow-slice, or mould. In dry weather, if the stubble be left high, when the grass appears to be completely parched and withered, it affords great nourishment; but the moment after the fall of rain, the stock should be removed; and in six weeks afterwards, if the stubble has been attended to, and not fed too low, the field will be luxuriantly green again, and fit to be fed. If the grass is cut for soiling or making hay, the land will require manure, as it is then an exhausting crop; but if kept solely for pasturage, it will maintain itself for years, unless it is very poor.

The Tussack Grass, (Festuca flabellata,) the "gold and glory" of the Falkland Islands, grows in great abundance, especially on the sandy, spongy and boggy soils of these islands, which are utterly uncultivable for other products; and, from the circumstance of its growing well in England, it may be inferred that there is a possibility that it might be adapted to many places in our Middle and Southern States, even where it would be bathed with the spray of the sea. Its roots form large balls, which rise five or six feet above the ground,

and are often as many feet in diameter. The culms spring from the tops of these balls, bearing beautiful sheathing, compressed, green leaves, which hang down all round in the most graceful manner, numbering from two hundred to three hundred to each plant, and are themselves six or seven feet in length. The interior of the stem, to a height of five or six inches above the root, is white and soft, of an agreeable flavor, resembling that of the filbert or the cabbage-palm. This substance consists of the lower sheath, with the young central leaves and stem firmly encased within each other. These heaps of tussacks generally grow apart, but within a few feet of each other, the intermediate space of ground being quite bare of vegetation, so that, in walking among them, a person is hidden from view, and the whole tussack-ground is a perfect labyrinth. Cattle thrive admirably well upon this grass, and fatten in a short time; and so fond are they of it, that when they can get at it, they will touch nothing else; and with horses it is the same.

With respect to the climate of the Falkland Islands, we have tolerably exact information. D'Urville, in the account of his voyage, states that it is much more temperate than might have been expected from its latitude (52° S.) From the observations made by himself and others, he concludes that the thermometer scarcely rises above 59°, or falls below 32° F. According to Bougainville, the winter is very cold, but the snow lies on the ground only for a short time. M. D'Urville also states that, in 1822, at the beginning of December, which answers to June in the northern hemisphere, the highest temperature observed was almost always between 51° and 66°. On the other hand, Sir Woodbine Parish tells us that in the Eastern Island the thermometer often ranges as high as 75°, in summer, and sometimes falls as low as 26°, in winter. He moreover confirms the French statements, that snow disappears in a few hours, and that the ice is seldom above an inch thick. It is affirmed by others, however, that the snow, near Port Cook, has been known to remain upon the ground several days. The days of summer are described as being long and warm, visited with occasional showers, and producing a rapid vegetation.

How far this plant would flourish about the "Everglades" of Florida, in the "Tulares" of California, or on the salt marshes and beaches near the Chesapeake and Delaware bays, experiment alone can determine. It has succeeded well on the island of Lewis, one of the largest of the Hebrides, in latitude 58° N., and is scarcely less luxuriant than in its native soil, having matured its seeds and pro-

ducing leaves five or six feet in length. Those who may interest themselves in procuring this grass from the Falklands may not be aware that there is another tussack grass on those islands, much inferior to the *Festuca flabellata*, the *Carex trifida*, which only grows to the height of a foot or a foot and a half, and spreads over every part, even to the top of the hills.

To those who may have occasion to cultivate the tussack grass from seeds, which necessarily will have to be obtained from abroad, it is recommended that they should sow them immediately on their arrival, in sandy, peaty soil, covering them to the depth of about an eighth of an inch. If under glass, a moderately moist temperature should be kept up, ranging from 45° to 55° F. When the plants are about half an inch in height, they may be put into three-inch pots, and gradually removed into a cooler situation, until they are about three inches high, when they may be planted six or seven feet apart in the open air. When the above-named heat cannot conveniently be obtained, a cold frame or garden hand-glass will be found the best substitute. The soil, in all cases, should be of a peaty nature, and not sifted nor chopped too fine, except that in which the seeds are sown. In the early stages of the plants, a weak solution of common salt, applied occasionally, is found to promote their growth. When once fairly established, they may be multiplied with the greatest facility by slips from the roots.

It may be proper to add, that the above remarks are only applicable to seeds imported from the Falkland Islands, or to such as have been subjected to several great and sudden changes of temperature, during some long sea voyage.

PLANTS CULTIVATED FOR THEIR FIBRE, OR OTHER USES IN THE ARTS.

Among the plants producing fibrous materials, which are worthy of experiment, or of further extension in the United States, are the "Manilla hemp" (*Musa textilis*); the "New Zealand flax" (*Phormium tenax*); the "China grass" (*Bœhmeria tenacissima*); and the "Sisal hemp" (*Agave sisalana*); the two latter of which are treated of in another part of this volume.

The Cochineal Plant, (Cactus cochinillifer,) or some of its congeners, is found in varying abundance throughout the torrid zone, as well as in several warm and temperate countries without the tropics. But much doubt still exists as to what particular species nourishes the cochineal insect, as it is believed that the plant which was named by Linnæus, and which has been almost universally called *Cactus cochinil-*

lifer, is not the one that produces the best Mexican cochineal; nor is it positively known in what part of America it was originally a native. Linnæus speaks of it as indigenous to Jamaica, and the warmer parts of the New World; but others assert that it was brought from South America by a Spanish priest.

"Cochineal," it is well known, is a small insect, (*Coccus cacti*,) which feeds upon the cactus above named, having a general appearance not very dissimilar to that of the "meal-bug" of our gardens, and equally covered with a white powdery substance. It was propagated in Mexico long before the conquest of that country, for its precious dye, which affords the fine red coloring matter so extensively used in the manufacture of carmine, and in dyeing silk and wool. There are two varieties known in commerce, the "black grain" and the "silver grain," which terms arose from the fact that, when first carried to Europe, this insect was considered to be a seed, or grain, and its dyes were spoken of as "grain" colors.

The plantations in Mexico, where the cochineal is produced, are called "Nopaleras," the most extensive of which are in the Misteca and Oaxaca.

M. de Raynal imagines that the color of the cochineal is to be ascribed to the red fig on which the insect feeds; but he is mistaken in this respect, as it does not feed upon the fruit, but only on the thick, succulent leaves, which are perfectly green; nor does that species of cactus bear red, but white figs. It is true, the insect may be reared upon the species with red figs; but that is not the proper plant of the cochineal.

The Dyers' Madder, (Rubia tinctoria,) is a perennial plant, a native of the south of Europe and Africa, as well as of the Levant; and, from the immense consumption of the roots as a dye-stuff, by calico printers and others, its extended culture in this country would become an object of great national importance.

Madder, it is well known, contains at least two distinct coloring matters, a fawn and a red, and the admixture of the former with the latter very much impairs its clearness and beauty. In consequence of this, two kinds of red are obtained from the root. One is simply called "madder red," which contains the whole of the coloring matter; the other, which possesses far more lustre, and is much more valued, is called "Turkey red," because it was first obtained from the Levant. The manner of producing this desirable effect was for a long period a subject of much interest and inquiry, as the process used in Turkey was enveloped in mystery. Notwithstanding that the

industry of the French chemists was stimulated by the interest which their government took in the discovery, the attempts, for a long time, at imitating this beautiful dye, were fruitless; and, when at length they proved successful, this success was limited to one or two establishments. It was only by very slow degrees that it became more diffused, and then each individual, who acquired the knowledge, jealously guarded his own peculiar secrets, which he had introduced in the process. The most important discovery, however, was made known, in 1804, by Sir H. C. Englefield, of England, for a fine lake, manufactured from madder, which was obtained after many different processes. He found that the color produced from the Smyrna was of a deeper and richer tint than any prepared from the Dutch madder. In pursuing his experiments, he discovered that the coloring matter might be extracted from the fresh roots, and thus, not only save all the expenses and difficulty attendant on the process with prepared madder, but the cost of transportation, also, which would be at least one-fourth less than for the roots entire; besides, when separated, the coloring matter may be kept for any length of time without danger of being impaired. A further advantage would also arise in the quantity obtained, as all the coloring matter could be extracted; while, in the manner which the dyers use the roots, a very considerable part of it is left in the refuse, and consequently lost.

The juicy root of madder, like that of other plants, consists merely of an assemblage of cells. A transverse section, when more fully grown, seen under the microscope, shows, first, a ring of very small cells (the bark); second, a more or less compact mass of larger cells, (the wood,) which become smaller and smaller, according to the central position; third, a texture quite different from the other two, occupying the more central part of the root, and which is a compound of vessels and fibres (the heart). These differences, in the structure of the roots, are still more clearly seen in a section made somewhat obliquely. At the very first period of existence, the root contains a light, yellowish-colored juice. If subjected to a similar examination, at a more advanced stage of its growth, the same parts will be found on a larger scale of development, but the juice will be less yellow. The heart of the root will have become more developed than the surrounding coat which covers it, and which, as the plant grows, is constantly diminishing, while the heart is increasing. At the same time, it is to be observed that the yellow color of the juice of the exterior parts (the bark and wood) is less dark than that of the juice, in the more internal parts. It might be inferred

from this, that the root contains more coloring matter when it is more advanced in age, and that, on the other hand, the coloring principle contained in the heart has a greater value than that of the cellular texture; and experience has shown that such is the case. The best quality, which is known in Holland, under the name of "Krap," is prepared only from the heart of the root that has been previously deprived of the other parts of less value. It is also generally known that the roots which are more advanced in age are preferable to the younger ones, and that the roots of the older plants have much more value, and bear a higher price, than those which are younger. And thus the *alizari*, as the same dye is called in the East, is also preferred, as it is derived from roots which have been in the ground five or six years. There is considerable difference, also, between these parts of the root, in the loss of weight, which they respectively sustain by drying. When the heart and surrounding layers are separately treated, the amount of this loss is, in the case of the former, 57 per cent.; but, in that of the latter, 76 per cent. The total loss of weight, in drying the raw root, as it comes from the ground, is from 72 to 80 per cent., or, on an average, 75 per cent. After a preliminary drying, which takes place, in the southern parts of France, in the open air, the roots, before being ground, are dried a second time in kilns or stoves, and undergo a further loss, say 7 or 8 per cent.; but this loss, according to experience, is at least from 10 to 15 per cent. of the light-red colored, and from 20 to 25 per cent. of the red roots; the latter, which are in the greatest demand, being, on that account, not dried quite so well by the cultivators. The loss of weight, in Zealand, after the first and second drying, is not less than in France.

In respect to the culture of madder, it need only be stated that the French and Dutch methods are herein given in detail, as this branch of industry is best understood and most successfully carried on in those countries; and, as our climate does not much differ, especially from that of France, no material alteration is required in our practice as regards the growth and management of the crop.

Madder is much cultivated in the French departement of Vaucluse, where a particular geological formation occurs, belonging to the more ancient alluvium, which seems to have been formed by the rivers Sorgue and Durance, by bringing a large quantity of calcareous matter and depositing it along their banks. The land thus formed, called "Paluds," contains from 80 to 90 per cent. of chalk, and is very favorable to the development of the root, being calcareous, light, and rich.

Madder is also cultivated in the Dutch province of Zealand, where it grows on the rich alluvial "bottoms" produced by the sea, and consequently abounding in soda and silicious sand, and in Alsace, where the soil is known to contain much lime. These differences in the constituents of the soil, no doubt, exercise a great influence on the production of the red coloring matter of this root; for it is well known that Zealand madder contains more of the yellow and less of the red coloring matter than the better sorts of the French and Alsacian products.

Madder is propagated both from seeds and from the off-sets of the roots. In Vaucluse, it is grown only from seed. The soil is well worked, and manured during the winter with a liberal coat of dung. In spring, the seeds are sown in beds about five or six feet wide, with a space of eighteen or twenty inches between the beds. As soon as the young plants are up, great care is taken in clearing the land. In the month of November, the beds are covered with a layer of earth to a thickness of two or three inches, this earth being taken out of the intervals between the beds. The second year, the weeding is continued, but it then presents no great difficulty nor expense, because the plants are more developed, especially when sufficient care has been taken in eradicating the weeds the first year. When the plants are in flower, they are usually cut and given to the cattle for the purpose of feeding, but are sometimes left for seed. It is stated that the tender foliage is as good for fodder as lucerne. The seeds are gathered when they present a dark-violet hue. In the third year, the plants require no other treatment than weeding, and again mowing or cutting the green crop. In tne month of August or September, the digging of the root is usually commenced, as soon as the soil is wet from autumnal rains. If the earth is dry, at the time of harvesting, the roots are simply cleaned; but if they are humid, they are washed. In digging, one or two workmen are placed along each bed, who make a trench in it, in the direction of its breadth, and work the land carefully over, throwing out the plants and loosening the roots, which are then pulled out of the ground with the hand, placed on linen cloths, and taken to the house, where they are dried in the open air and packed up in bales.

Madder is not cultivated from seeds, in Zealand, but from shoots, or off-sets, planted in May, in well-worked ground, in rows about two feet or more apart. Great care is taken the first year in extirpating the weeds. In November, the plants are covered with earth taken from the intervals between the rows. The weeding and covering with

earth are repeated the second year. The third year, the ground is still carefully weeded, and digging begins in August. The roots are lifted from the ground with strong spades and transported to the stoves (Meestoven) for the purpose of being dried, because the climate is too wet to dry the roots in open air, as in the south of France. After the first operation, the roots are dried again before they are ground. The roots, being cleansed and ground to a fine powder, are then packed in barrels and sold. There is, however, some difference in this trade in Zealand and Vaucluse. In the former, the farmer not only produces the root, but the madder in a manufactured state; in the latter, it is only sold in the dry root (garance.) In Vaucluse, the root is commonly dug the third year, when it is about thirty months old. In Zealand, it is frequently taken out of the ground the second year, when it is eighteen months old; and this is done because the severe winter of Holland injures the crop. In some cases, however, the Dutch farmers contrive to keep the roots in the ground another year.

The average yield of dried roots to the acre, in Vaucluse, is 2,800 pounds, or about 2,240 pounds of madder powder. In Zealand, the yield is 2,350 pounds of powdered madder, of the first quality, besides about 100 pounds of an inferior article.

In the preparation of madder for market, there are three modes of drying the roots—by the sun, in the shade, and with stoves. When dried by the sun, there is a considerable loss in weight, and in the quality of the roots. Therefore, it is preferable to dry them in the shade, exposed to a current of air, although the operation may be more promptly effected with a stove; but, by the latter process, they lose nearly seven-eighths of their weight.

When the roots are sufficiently dried, they are reduced to a powder, first by placing them on close osier hurdles, where they are lightly beaten with flails, which separates the earth as well as the epidermis and radicles, the smallest of which are used for inferior dyeing. The larger roots, which are good and of a red color, are then ground in a small mill, winnowed or sifted, to separate the remaining dirt, redried, ground, and cleaned once more, and reduced to a fine powder by passing through a bruising mill; then packed in barrels or casks for market or use.

The following information, relative to the culture of madder in the United States, is founded on experience, and, if strictly observed, will be conducive to successful results: A location facing the south or south-east is to be preferred. In choosing a soil, it should be neither too wet nor too dry, too stiff nor too light. A deep, rich, upland,

sandy loam, free from foul grass, weeds, stones, and stumps of trees, on which there has been cultivated a crop of potatoes, peas, wheat, or Indian corn, the season previous, perhaps, would be the best, bearing in mind that the presence of calcareous matter in the soil is essential for the production of good madder, to be used in dyeing. The land should be ploughed deep, once in September, and again in October, and permitted to lie during the winter, in ridges, to be acted upon by the frost. As soon as the spring has opened and the ground become dry and warm—say on the first of April, in Tennessee, the middle of April, in Ohio, and the first of May, in New York—plough again deep, harrow well, and strike it into ridges with a one-horse plough, three feet wide, with four-foot water-furrows between, or make the ridges seven feet wide at once, raising them, if the ground be moist or wet, ten or twelve inches, or if the land be dry, six or eight inches above the natural surface; then, with a light harrow, level and shape the ridges as in a well-formed bed for carrots or beets.

The madder-sets, or seed-roots, are best selected when the crop is dug in the fall. Those which grow horizontally, having numerous eyes, are regarded as the best. They should be separated from the lower roots and buried in a cellar or pit, where they are to remain during the winter; or they may be covered with earth in heaps, after the manner of storing potatoes in the field. If they are not dug in the fall, it must be done early in the spring, before they begin to sprout. Previous to planting, they should be cut or broken into pieces, containing from two to five eyes each, say three or four inches in length. The time for planting is as early in the spring as the ground can be got in good order, and there is no longer any danger from severe frosts. With the land prepared, as directed above, stretch a line lengthwise the beds, and, with a hoe or some other suitable implement, make a drill from two to four inches deep, according to the moisture or dryness of the soil and climate, along the edges of the beds, say six inches from the margins, and then other drills through the middle, about two feet apart. Into these drills, insert the sets ten inches asunder, and cover them from two to four inches deep with fine earth, patting it lightly with a hoe, after the manner of planting Indian corn.

As soon as the young plants are seen above the ground, they should be carefully hoed, so as to destroy the weeds, which operation must be repeated as often as the weeds are liable to be injurious to the crop. If any of the sets have failed to grow, the vacancies may be filled by taking up and transplanting parts of the strongest roots, which may be done in June or July. When the plants are ten or twelve inches

high, the tops are to be bent down to the surface of the ground and covered, except their tip-ends, with earth shovelled from the alleys. They should be bent outward, as well as inward, so as to fill the vacant spaces of the beds—say, about a foot in each direction. After the first covering, repeat the weeding, if necessary, and run a single-horse plough through the alleys several times to keep the earth mellow and clean. As soon as the plants again become ten or twelve inches high, bend down and cover as before, repeating the operation as often as the plants will admit, which is commonly three times the first season. The last time may be as late as September, or later, if there be no frost. By covering the tops in this manner, they throw out new roots, with which it is designed to fill the ground as full as possible. When the vacant spaces are entirely filled with the plants, there will be but little chance for the growth of weeds; but all that do appear must be pulled out by hand.

The second year, the beds must be kept free from weeds, and the tops of the plants covered with earth from the alleys as in the preceding year, which may be repeated two or three times in the course of the season. If the alleys now present deep narrow ditches, and it is difficult to obtain good earth for covering the tops, that operation may be omitted, this season, after the second time. Care should be taken, when covering the tops, to keep the edges of the beds as high as the middle; otherwise, the water from heavy showers will run off, and the crop suffer from drought.

The third year, very little labor or attention will be required, as the plants now cover the whole ground, and but few weeds appear. Should any weeds be seen, however, they must be eradicated; otherwise their roots will cause trouble when harvesting the madder. The crop is sometimes dug the third year; and, if the soil and cultivation have been good, and the seasons warm and favorable, the roots will be of good quality; but, generally, it is much better in quality, and more in quantity, when left until the fourth year.

The digging or harvesting of the roots may be performed from the middle of August to the end of September. The first thing to be done is to remove the tops of the plants, and about half an inch of the surface of the earth, with a sharp-edged shovel; then take a plough of a large size, with a sharp coulter, and a double team, and run a furrow outward, beam-deep, around the edge of the bed; stir the earth with a fork or iron-toothed rake, removing it from the bottom of the furrow, and carefully picking out all the roots;

then plough another furrow beam-deep, as before, remove the earth, pick the roots, and thus proceed until the whole bed is completed.

As soon as possible after digging, take the roots to some running stream, if at hand, but, if not, to a pump or well, to be washed. Take a large round sieve, from two and a half to three feet in diameter, with the meshes about as open as those used in winnowing wheat. Into this sieve, put half a bushel of roots at a time, and stir them in the water, pulling the bunches apart, so as to wash them clean ; then lay them on movable platforms, about two inches deep, to dry in the sun. These platforms should be placed side by side, not far from the farm building, in rows running east and west, with their ends north and south, leaving sufficient room to walk between them. The south ends may be elevated about eighteen inches, and the north ones about six inches from the ground. After the second or third day's drying, the roots should be protected from dews at night, and from rain, by placing the platforms one upon another, and covering the uppermost one with tarpaulins or boards. Then spread them out again in the morning, or as soon as danger from rain is over. In five or six days of ordinarily fine weather, the madder will be sufficiently dried to be stored away preparatory to grinding.

If the climate is not hot and dry enough to deprive the roots of their moisture, and thus render them fit for grinding, resort may be had to stoves or kilns. As soon as they are thoroughly dried, they may be taken to a barn and gently thrashed with flails, and deprived of their rootlets and particles of dirt by winnowing ; or, what would be better, if the culture were conducted on a larger scale, they might be broken in a cast-iron bark-mill, or by some other machinery appropriate for the purpose, so that the particles thus reduced could readily be fed into a common grist-mill, or, perhaps, a mill constructed of iron. Let it be borne in mind that, if the roots are not broken and ground immediately, they will gather dampness from the atmosphere, so as to prevent them from grinding freely. When ground to the requisite degree of fineness, the madder is fit for use, and may be packed in barrels like flour.

The quantity of madder yearly consumed in the United States, chiefly imported, is variously estimated from 4,000 to 5,000 tons, valued at, say at least $1,000,000—a sum paid annually to foreign countries for an article that might be produced as cheaply, and of as good quality, at home.

TREES AND SHRUBS.

The Tea Plant, (Thea viridis,) which has so long afforded a most grateful beverage to millions of people in every civilised country of the globe, there is much reason to believe, may be successfully cultivated in favorable situations and under proper management, for local consumption, at least, in most, if not all of our Southern States. This was partially realised from an experiment made at Greenville, in the mountainous parts of South Carolina, by the late Junius Smith, in 1848 to 1852. He imported several cases of black and green tea plants, of Chinese stock, of from five to seven years' growth, and planted them in the village above named, where they remained about two years. On their removal to a plantation in that vicinity, in March, 1851, Dr. Smith stated that, "they grew remarkably last summer, and are now fully rooted, with fine large main and collateral roots, with an abundance of fibrous radicles. They all stood the snow, eight or nine inches deep upon the level, on the 3d of January, and the severe frosts of winter, without the slightest covering or protection, and without the loss of a single plant. They are now all forming part of the plantation, composed of those received from China last June, and a few planted the first week in June, which germinated the 17th of September. All these young plants were thinly covered with straw. Some of them have lost their foliage—others have not. The stems do not appear to have sustained any injury. The fresh buds are beginning to shoot. I cannot help thinking that we have now demonstrated the adaptation of the tea-plant to the soil and climate of this country, and succeeded in its permanent establishment within our borders."

Considering the practical bearing this subject has on the economy and agricultural interests of our Southern States, it is surprising that a simple herb, which has proved of such universal acceptance, should retain this position in the world for centuries, and yet still continue to be restricted in its production almost entirely to the country of its origin, although corresponding regions, with respect to latitude, elevation above the sea, and other circumstances, which modify the climate, are open to its introduction and culture, and the most intelligent, as well as the most enterprising merchants and others have ever sought to learn every fact connected with its growth and subsequent preparation. Though regarded, in general, as a luxury, and by some even as food, yet it is not an article from which the people of

any country should be debarred. On the contrary, it is the policy in this case, as well as in most others, of every government, to gratify the wishes of its people, and to facilitate the acquisition of this luxury by its economical importation, or, what would be far more desirable, to extend the production to its own soil. Respecting the expediency of such a measure in this country as that last named, little more need be stated than that most of our citizens will have it, and millions of dollars will annually be paid for its importation. To the argument which has often been advanced, that the very low rate of wages in China is the reason why the production of tea has not been encouraged in this country, it may be stated that, with improved machinery and other appliances, facility of transportation, robust and well-fed laborers, and probably with the aid of the Chinamen, now in California, there can be little doubt that we can successfully compete, at least for local consumption, with the primitive utensils, tedious manipulations, and absence of railroads, canals, steam navigation, and even of common roads, of the enfeebled and poorly-fed Asiatics. The cost of the transportation of tea in China, say at a distance, upon an average, from the plantations to Canton, the port of shipment, of 800 to 1,000 miles, at a waste of from six weeks' to two months' time, whole cargoes being constantly carried upon the backs of porters, is about four cents a pound, or about one-third of its value at the place of its growth. It is supposable that in no part of the United States, at a corresponding distance from the seaboard, would the cost of carriage be equal to one-fourth of that sum, or occupy one-tenth of the time. Dr. Jameson, superintendent of the tea plantations of the East India Company, on the Himalayan mountains, in his report of 1847, remarks that the task-work of one laborer is to dress, weed, and keep in order three acres of tea-land. In our Middle and Southern States, one hand cultivates, annually, and keeps in order, six acres of cotton, or of Indian corn. Therefore, assuming the amount of time for cultivating the respective crops to be equal, the American laborer would perform more than double the amount of work done by the Hindoo, which, undoubtedly, is about the difference in their physical force. Again, low-priced labor compels cheap living, which, with the Hindoo, consists principally of a little boiled rice, without animal food. This meagre diet just keeps his attenuated frame in existence, and renders him incapable of severe toil. On the contrary, the hardy laborer of the South is well and amply fed, three times a day, upon the healthiest food consumed by man—bacon, hommony, and corn-bread. But the chief part of the expense incurred

in bringing tea to the consumer in this country consists in freight, insurance, storage, and the profits and commissions of the importers, factors, retailers, &c., most of which would be saved were this article produced near the place of its consumption. Without further elucidation of the subject, let us be content to rest the claims of the American cultivator for success upon the merits of the arguments herein set forth.

The tea-plant is not only found in China and Japan, chiefly in a cultivated state, but is indigenous in the mountains which separate China from the Burmese territories, especially in Upper Assam, bordering on the province of Yun-nan. It is also cultivated in Nepal, at an elevation of 4,784 feet above Bengal, in latitude 27° 42′ N.

Before proceeding in the inquiry, it would be desirable to ascertain whether one or several species of the genus *Thea* yield the several varieties of tea; as this might explain some of the discrepancies in the accounts respecting the soil and climate required for its cultivation. Some authors, among whom are Mr. Fortune and Dr. Lettsom, who travelled extensively in China, and had ample opportunities for investigating this subject, consider that all the varieties of tea may be obtained from the same plant, and that the differences are therefore due to the soil or climate, or to the age of the leaf and the mode of preparation. Others, on the contrary, are of the opinion that they are produced from at least two distinct species, *Thea viridis* and *Thea bohea*. There is no doubt, however, that the plants usually known as "Green" and "Black," when cultivated under similar circumstances, retain permanently their characteristics, and that their leaves, respectively, generally resemble those obtained after infusing good specimens of green and black tea. The green tea plant, moreover, is much more hardy than the black; one of the former having lived twenty years in the open air, near London, and being only killed in the very severe winter of 1837–38, when the thermometer fell to 4½° F. Yet, from the great extent of territory over which the tea-plant is found, and from the variety of situations in which it is produced, there can be but little doubt that it is grown in very different soils, though there are, doubtless, certain physical conditions that are best suited to the production of the finest flavored teas.

The tea-plant loves to grow in valleys, at the foot of mountains, and upon the banks of streams, where it enjoys a southern exposure to the sun, though it endures considerable variations of dryness and moisture, and of heat and cold; for it flourishes in the climate

of Pekin, in latitude 40°, as well as about Canton, in 23° 8′ N.; and it is observed that the degree of cold at the former place is nearly as severe in winter as it is in some of our Middle States. The best tea, however, grows in a mild, temperate climate, the country about Nankin producing a better article than either Pekin or Canton. Mr. Bruce, who travelled in Upper Assam, in 1836, describes the tea districts as consisting of little mounds or hillocks of earth, on which large trees had grown, their roots alone appearing to save them from being washed away. One thing he observes as worthy of notice, that all the Assam tea grows near water, of which it appears to be very fond, for wherever there is a small stream, tea is sure to be found. He subsequently discovered, however, that tea plantations in that country were very extensive, both on the hills and in the plains. But excessive moisture, either in the soil or in the air, is not congenial to the growth of the tea-plant, as it is evident from its preference for sandy or porous soils, or the moulds, in the moist climate of Assam, but which probably would not be requisite where the climate is dry.

Mr. Fortune, who had frequent opportunities to inspect some of the most extensive tea districts of Canton, Fokein, and Chekiang, states that the soil of those of the northern provinces is much richer than it is in Quantung. "Tea shrubs," he says, "will not succeed well unless they have a rich sandy loam to grow in. The continual gathering of their leaves is very detrimental to their health, and, in fact, ultimately kills them. Hence, a principal object with the grower is, to keep his bushes in as robust health as possible; and this cannot be done if the soil be poor. The tea plantations in the north of China are always situated on the lower and most fertile sides of the hills, and never on the low lands. The shrubs are planted in rows, about four feet apart, and about the same distance between each row, and look at a distance like little shrubberies of evergreens. The farms are small, each consisting of from one to four or five acres; indeed, every farmer has his own little tea garden, the produce of which supplies the wants of his family, and the surplus brings him in a few dollars that are spent on the other necessaries of life." In Japan, tea is planted around the borders of fields, without regard to situation or soil.

The tea-plants are raised from nuts, or seeds, usually sown where they are to remain. Three or more are dropped into a hole, and covered with earth four or five inches deep; these come up without any further trouble, and require little culture, except that of removing

weeds. The leaves are not collected from the cultivated plants until they are three years old; and, after growing nine or ten years, they are cut down, in order that the young shoots, which will then rise, may afford a greater supply of leaves. The best time to gather the tea is while the leaves are small, young, and juicy. The first gathering usually commences at about the end of February, when the leaves are young and unexpanded; the second, about the beginning of April; and the third, in June. The first collection, which only consists of fine tender leaves, is most esteemed, and is called by us "Imperial" tea. The second is denominated "Tootsjaa," or Chinese tea, because it is infused and imbibed after the Chinese manner. The last gatherings, which are the coarsest and cheapest of all, are drunk by the people of the lowest class. Besides the three kinds of tea named above, it may be observed, that, by sorting these, the varieties become still further multiplied. The Chinese, however, know nothing of "Imperial" tea, "Flower" tea, and many other names, which, in Europe and America, serve to distinguish the quality and the price of the article; but, besides the common tea, they distinguish two other kinds, namely, the "Voui" and "Soumlo," which are reserved for people of the first order of society, and for those who are sick. The principal varieties used in Europe, and in this country, are the "Green" tea, which is the "Bing," or common tea of the Chinese, and is gathered in April; the "Voui," or "Vou-tche," a delicate kind of "Young Hyson," which differs only from the other in being gathered a few weeks earlier, and consists of the young leaf-buds just as they begin to unfold; and the various descriptions of "Black" tea, which diminish in quality and value as they are collected later in the season, until they reach the lowest kind, called by us "Bohea," and by the Chinese "Ta-cha," or large tea, on account of the maturity and size of the leaves. The early leaf-buds, in spring, being covered with a white, silky down, are gathered to make "Pekoe," a corruption of the Canton word *Pa-ko*, white down. A few days later growth produces what is sometimes styled "Black-leaved Pekoe." The more fleshy and matured leaves constitute "Souchong;" as they grow still larger and coarser, they form "Congou;" and the last and latest picking of all is the "Bohea." The variety named above, called "Voui," is a scarce and expensive article, and the picking of the leaves in so young a state does considerable injury to the plantations. The summer rains, however, which fall copiously about this season, moisten the earth and air, and, if the plants are young and vigorous, they soon push out fresh leaves.

The process of gathering tea is one of great nicety and importance. Each leaf is plucked separately from the twig; the hands of the gatherer are kept clean; and, in collecting some of the finer sorts, it has been stated, upon credible authority, that he is obliged for some weeks previous to abstain from all gross food, lest his breath or perspiration might injure the flavor; to wear fine gloves while at work, and to bathe two or three times a day during this period. In the general harvest seasons, the natives are seen in little family groups on the side of every hill, when the weather is dry, engaged in gathering the tea-leaves, which are stripped off rapidly and promiscuously into round baskets, made for the purpose, of split bamboo or ratan. When a sufficient quantity is gathered, it is carried home to the cottage or barn, where the operation of drying is performed. The Chinese dislike gathering the leaves on a rainy day, for any description of tea; and never will do so, unless necessity requires it. Some even pretend to distinguish the teas made on a rainy day from those made on a sunny day. The process of rolling and drying the leaves, it is stated, can only be learned by actual experience; yet the system adopted to attain this end is as simple as it is efficacious. Let it be borne in mind, however, that the grand object is to expel the moisture, and at the same time to retain as much as possible of the aromatic and other desirable secretions.

As to the differences of flavor and color peculiar to the green and black teas, it is well known that, in many instances, they are produced by art. In describing the green teas grown in the districts of Chekiang, Mr. Fortune remarks that "it must not be supposed that they are the green teas which are exported. The leaf has a much more natural color, and has little or none of what we call the beautiful bloom upon it, which is so much admired in Europe and America. There is now no doubt that all these blooming green teas, which are manufactured at Canton, are dyed with Prussian blue and gypsum, to suit the tastes of the 'foreign barbarians!' Indeed, the process may be seen any day during the season by those who will give themselves the trouble to seek after it. It is very likely that the same ingredients are also used in dyeing the northern green teas for the foreign market." The Chinese, it is asserted, never use these dyed teas themselves; and certainly their taste, in this respect, is more correct than ours. It is not to be supposed that the dye employed can produce any very bad effects upon the consumer, for, had this been the case, it would have long since been discovered. As to the opinion that green tea owes its verdure to an inflorescence acquired from plates of copper, on which

it is supposed to be curled or dried, there is no foundation for the suspicion, as the infusions undergo no change on the addition of volatile alkali, which would detect the minutest portion of copper by turning the liquors blue. And, besides, the drying pans and furnaces used throughout China, for this purpose, are said to be invariably made of sheet-iron.

The Box-wood Tree (Buxus sempervirens arborescens) is a hardy evergreen shrub or tree, indigenous to many parts of Europe and Asia, and has proved itself well adapted to the climate of the United States. In its natural habitat, it seldom exceeds twelve or fifteen feet in height, with a trunk from six to eight inches in diameter; but, in a state of cultivation, it sometimes attains double these dimensions.

This tree is found abundantly in Turkey, particularly on the shores of the Black sea; but a great portion of the box-wood of commerce, sold in the European and American markets, as "Turkey" box, is grown in Circassia and Georgia, whence it is brought to Odessa for shipment. It is also found in various parts of Persia, China, Cochin-China, and, from some statements, in Japan. This tree, which is of great longevity, and subject to but few diseases, is sufficiently hardy to stand the open air near Philadelphia, without protection during winter, where it has attained the height of twenty-five feet, with a trunk two feet and a half in circumference, or about ten inches in diameter. It may be propagated from seeds, by cuttings, or by layers. When allowed to grow freely, it produces an abundance of seeds, which should be gathered as soon as the capsules appear ready to open, and sown immediately in light, rich earth, consisting chiefly of vegetable mould well drained.

The principal use to which the wood of this tree is applied in this country is for engraving, for which purpose it is admirably adapted; and, for the finer class of illustrations, there is no wood which can be employed as a substitute. Hence, as in the case of the cork-oak, should non-intercourse between this country and the Old World ever occur, we should soon be without a supply of this useful material, which is a strong argument for extending its culture by establishing plantations of it on some of the waste lands of our Middle and Southern States.

The European Sweet Chestnut, (Castanea vesca,) a native of Asia Minor, but cultivated in the temperate parts of Europe and Africa from time immemorial, has proved itself well adapted to the climate of the Middle and Southern States, when grafted on stocks of the

American species, and is deserving of extended culture in this country for its fruit.

The two most desirable varieties of this tree, cultivated in France, are "La Châtaigne verte du Limousin," which produces very large, excellent nuts, of a rich creamy flavor and aromatic odor, when roasted, that will keep a long time, and the tree of which preserves its leaves green much longer than any of the other sorts; and "La Châtaigne exalade," the fruit of which is the best of all common chestnuts for the table; but, although the tree is low, with spreading branches, it is such an abundant bearer that it soon exhausts itself.

The principal countries in which the chestnut is employed as an important article of food are the south of France, Spain, and the north of Italy, where it serves, in a great measure, as a substitute both for potatoes and bread. In Spain, it is produced in such abundance as to be, not only a common food of the peasantry, but an article of exportation to the more northern nations. The quantity of chestnuts consumed in Great Britain and Ireland exceeds 20,000 bushels per annum.

The usual modes of cooking chestnuts in France and Italy are, boiling them in water, with simply a little salt, or with leaves of celery, sage, or any other herbs which may impart to them an agreeable flavor; and roasting them, in hot ashes or in a coffee-roaster. They are also occasionally scorched before the fire, or on a shovel; but, when thus prepared, are not considered so good. In whatever way they are roasted, the French cooks previously slit the skin, or shell, of all except one; and, when that cracks and flies off, it is an indication that the rest are done.

The Grammont or *Sweet-acorned Oak*, (Quercus gramuntia,) formerly a native of the wood of Grammont, near Montpelier, in France, and growing wild at present in great abundance in some of the forests of Spain, is quite hardy, maturing its acorns in England, where it has been introduced; and would be a desirable acquisition to our Middle and Southern States.

Captain S. C. Cook, (now Captain Widdrington,) who paid great attention to this oak, when in Spain, remarks of it as follows:—

"This species is quite distinct from the Q. ilex, its nearest congener. The leaves are thicker, more rounded at the point, of a dull glaucous green, and the tree altogether is of a more compact and less graceful form than the Italian ilex. The great and essential difference, however, consists in the acorns, which are edible, and, when in

perfection, are as good as, or superior to, a chestnut. To give this sweetness, they must be kept; as, at first, they have a considerable taste of the tannin, like those of the other species, which disappears in a few days, and accounts for the skepticism of some writers, who assert that both sweet and bitter acorns are the product of the same tree, and that their sweetness is no character. These are the edible acorns of the ancients, which they believed fattened the tunny fish on their passage from the ocean to the Mediterranean—a fable only proving that the acorns grew on the delicious shores and rocks of Andalusia, which, unhappily, is no longer the case. Remains of them, however, may still be traced in the West; and they fattened the swine which produced the celebrated salt meats of Malaga and that vicinity. These are the bellotas which Teresa, the wife of Sancho Panza, gathered herself, in La Mancha, where they grew in the greatest perfection, and sent to the Duchess, wishing, instead of their being only the best of their kind, they were the size of ostrich-eggs. I have frequently seen them produced by individuals, and offered to the company as *bon-bons* are in some countries, with a sort of an apology for their intrinsic value, from their flavor and size. This species is, beyond question, very hardy, I believe even more so than the ilex of Italy. It ascends the sides of the sierras in the inclement region of the centre of Castile; and, in Arragon, is seen within the limits of the *Pinus sylvestris* and *P. uncinata*, as also in the cold and wintry valley of Andorre. The widest forests of it are now in Estremadura, where the best sausages and other salted meats are made from the vast herds of swine which are bred in them."

As a proof of the hardiness of this tree, Dralet mentions that he found it growing on the crest of the mountains of the Andorras, where the snow covers the ground during several months of the year; and this circumstance, he says, explained to him the reason why the kings of Spain had succeeded in getting it to grow in the park at the Prado, near Madrid, where they had tried to cultivate the olive in vain.

The Kermes Oak, (Quercus coccifera,) a low, bushy, evergreen shrub, much resembling a holly in miniature, a native of the south of Europe, and well known as producing the "kermes," or scarlet grain of commerce. Although there has been but little demand for this article since the discovery of America, in consequence of the cheapness of cochineal, this shrub, doubtless, could be cultivated in favorable locations in the Middle and Southern States, on which

could be propagated the kermes, somewhat after the manner they are at present in Turkey and the Levant.

This production was known to the Phœnicians, before the time of Moses, under the name of *thola;* and to the Greeks by the appellation of coccus, and to the Romans that of *coccus baphica;* hence the origin of the word "Coccinati," the persons who wore robes that were dyed with the kermes. Previous to the discovery of America it was employed to a great extent in dyeing a very rich blood-red, which is of so permanent a nature, that the old tapestries of Brussels, and other parts of Flanders, although manufactured more than two centuries ago, have lost none of their richness of tint. Since the settlement of America by Europeans, it has been supplanted, in a great degree, by the Coccus cacti, or cochineal. The kermes, nevertheless, is still extensively prepared in some parts of Spain, as well as in the East; and Bancroft states in his "Permanent Colors," that, with a solution of tin, which is used with the cochineal, the kermes is capable of imparting a scarlet quite as brilliant as that dye, and perhaps more permanent. At the same time, however, as ten or twelve pounds contain only as much coloring matter as one pound of cochineal, the latter, at its ordinary price, is more economical.

The kermes (*Coccus ilicis*) occurs as a parasitic insect, having all the appearance of a berry or seed, exhibiting not the slightest indication of its insect nature, being immovably affixed, in clusters, to the branches of the oak, upon which it subsists, by introducing into the substance of the stem a long and delicate haustellum. It is only at the close of its existence, however, that it assumes the form of a seed. Although the insect is provided with two legs, and, when young, possesses locomotive powers, yet, after impregnation, it greatly increases in size, and the eggs are deposited beneath the body; so that, by degrees, as the eggs are excluded, the two surfaces of the body come together and form a covering for the eggs; hence, it will be observed that it is only the females which are collected for traffic; the males, in the perfect state, being minute, active, two-winged flies, totally unlike their inert partners.

In the natural state, the kermes are of a shining appearance, and of the color of a plum covered with a whitish bloom. In the condition in which they are brought to market, they appear of a dull reddish-brown, which is not, of course, the natural color of good kermes, but is imparted to them by steeping in vinegar. The inhabitants of the countries where these insects are obtained, distinguish three

stages in their existence. In the Provençal language, the term "Le ver" is applied to them, when they are in the earliest stage of activity; "Le ver couvé," subsequently, in the month of April, when they become stationary; and "Le ver commence d'éclore," in the last stage, in the middle or towards the end of May, when each female insect is found reduced to a skin, covering its brood of eggs to the number of 1,800 or 2,000.

The crop of kermes is more or less abundant, according to the mildness or severity of the preceding winter; when, therefore, there has been little or no frost, and the weather has been generally mild, a good yield is expected, which is not obtained every year; and, as there is no trouble in planting or otherwise attending to the management of the trees, after they are once established, and as no other instruments are required for collecting the kermes than young fingernails, it may be reasonably supposed that the harvest may be an inexpensive one. The kermes are usually collected in the morning before the dew is off the oaks, as at that time their leaves and prickles inflict less injury to the hands. An experienced person will thus pick two pounds each day. It is stated that the price of the kermes decreases considerably, according to the period in which they are gathered. Those earliest collected are the most valued, and the later ones less, in consequence of being lighter than those first obtained, owing to the young insects having escaped. The merchants who purchase the kermes, immediately steep them in vinegar, and then expose them to the action of heat sufficient to destroy any remaining vitality in the young. This process changes their color to a bright-red hue, for which they have so long been celebrated.

The Gall-nut Oak, (Quercus infectoria,) a native of Persia, Asia Minor, Arabia, Egypt, Morocco, and Algeria, in its natural habitat, is an evergreen shrub, with a crooked stem, and seldom attains six feet in height. From the circumstance of its growing near Paris, where it bears the winter quite well in the open air, though losing its leaves in the autumn, it doubtless would be adapted to the climate of our Middle and Southern States.

On this shrub, it may be unnecessary to state, is found the well-known "gall-nuts" of commerce, which are extensively used in the manufacture of writing-ink, and in dyeing. These excrescences are the product of the gall-fly, (*Cynips scriptorum*,) a small insect of a pale-brown color, which may often be found enclosed in the galls sold in the shops of the druggists, collected before the fly had made its

escape. The natural history of the family to which this insect belongs may be given in a few words, although the physiological nature of the changes that take place in the action of the juices of the plants attacked by them, whereby galls of a very great diversity of form are produced, has not been ascertained. The female cynips is furnished with an instrument, or ovipositor, of a curved form, which, in most of the species, is concealed in the abdomen, with the extremity only slightly exposed. After impregnation, the eggs are deposited by means of this boring instrument, which is exsertile, within the leaves or twigs of various trees and shrubs; shortly after, the galls are formed on the outside of the attacked part, the eggs being forced from the place where they were originally deposited, and occupying the centre of the newly formed gall, which is generally of a fleshy nature, and serves as food to the young grub when hatched. The pupa state succeeds, and is passed either within the gall, as in the insect now under consideration, or in the earth, the larva having previously to its change eaten its way out; soon after, the insect assumes its imago or perfect state. Hence, it will at once be obvious that a gall from which the insect has escaped must necessarily contain less of the astringent principle than one which has its interior less consumed by the insect remaining enclosed therein; and hence it is that there are two kinds of gall-nuts known in commerce: those which still contain the insect, and are known in the trade under the names of "Black," "Blue," or "Green" galls, termed *yerly* by the natives of the country in which they are collected; and those from which the insect has escaped, and which are called "White" galls. The latter contain not more than two-thirds of the astringent qualities of the former, and are of a pale-brown or whitish color, being not so heavy and less compact.

Should this insect ever be propagated in any part of the United States, it would necessarily have to be brought over in the gall nut, in the larva state, and then at some period after the introduction of the oak itself, unless it should be found that the flies, after coming out, would deposite their eggs on some of our native oaks, on which they might succeed.

The Ægilops, or *Valonia Oak*, (Quercus ægilops,) is indigenous to the islands of the Archipelago, and, indeed, to all Greece, and often grows to a height of fifty or sixty feet. It is perfectly hardy in the climate of England, from which it may be inferred that it also would grow in favorable localities in our Middle and Southern States.

The cups and acorns of this tree are annually conveyed to Europe, where they are in great demand for tanning, and are believed to con-

tain more tannin than any other vegetable, in proportion to their bulk. These acorns, which are commonly called "Valonia," form a very considerable article of export of the Morea and the Levant, being worth in England from $60 to $70 a ton. The more substance there is in the husks, or cups, of these acorns the better. They are of a bright-drab color, which they preserve as long as they are kept dry; but dampness injures them, as they then turn black, and become impaired, both in quality and strength.

A kind of gall is found on this tree somewhat similar to that on the Quercus infectoria, and which is employed for the same purposes. These galls are rugose, of an angular form, and are either the fruit itself, distorted by the puncture of the insect, (*Cynips quercus calycis*,) or merely the scaly cup which is enlarged into a gall.

The Date Tree (Phœnix dactylifera) is indigenous to Syria, Arabia, and the lower parts of Persia, Egypt, and Northern Africa, whence it was introduced into the South of Europe; and it is also more or less cultivated in British India, South Africa, and in some parts of America. Though belonging to the extensive family of palms, which abound and flourish in most tropical regions, it attains perfection only in comparatively high latitudes, and doubtless would be adapted to the soil and climate of the more arid regions of California and of our Southern States.

The date is a lofty tree, growing to a height of sixty feet, with a rugged trunk, crowned with leaves six or eight feet long, with pinnæ three feet long, and a little more than an inch broad. The flowers of both sexes, which grow on separate trees, come out in very long bunches, from the trunk, between the leaves, and are covered with a spatha, which opens and withers. Those of the male tree have six short stamens, with narrow, four-cornered anthers, filled with pollen. The female flowers have a roundish germ, which afterwards becomes an oval berry, with a thick pulp, enclosing a hard, oblong stone. This berry is the fruit known as the date of commerce, upon which a considerable portion of the people of Egypt, Arabia, and Persia almost entirely subsist. A single tree will produce from one hundred to three hundred pounds of this fruit in the season. They come into bearing at from six to ten years of age, and are fruitful for upwards of two hundred years. Being dicecious—that is, the stamens and pistils occurring in the flowers of different trees—the crops entirely fail, or the fruit is unfit for food and worthless, if the fecundation is in any way prevented. It is a fact worthy of note, however, that the male

flowers will keep during the year; and yet, if shaken over the female flowers, at the time of opening, impregnation will readily take effect.

The extensive importance of the date tree, in the countries where it occurs, is perhaps one of the most curious subjects to which a traveler can direct his attention. Independent of the use of the fruit as food, the inhabitants make a conserve of it with sugar, and even grind the hard stones, to feed to their camels. In Barbary, they form handsome beads of these stones. From the leaves, they make couches, baskets, bags, mats, brushes, and fly-traps; the trunk is split, and employed in erecting small buildings, also for fences to gardens; and the stems of the leaves are used for making cages for their poultry. The threads of the web-like integument at the base of the leaves are twisted into ropes, which are employed in rigging small vessels. The amylaceous central part of the trunk is also good to eat, and the buds are esteemed a delicate vegetable; and even the young shoots are said to resemble asparagus. The sap, which is sweetish when first collected, and may be drunk as a mild beverage, is distilled into a kind of spirit, known in eastern countries by the name of "arrack." It is obtained by cutting off the head of the tree, and scooping out a hollow in the top of the stem, where, in ascending, it lodges. Three or four quarts may be obtained daily from a single palm, for ten or fifteen days; after which, the quantity decreases until, at the end of six or eight weeks, the stem is exhausted, becomes dry, and is used for fuel.

The Tamarind Tree (Tamarindus indica) is a native of Egypt and Arabia, as well as of the East Indies. In the West India islands, where it has become naturalised, it is cultivated both for the sake of its shade and its acid, cooling, highly grateful fruit, the pulp of which is mixed and boiled with sugar, and forms an important article of commerce. It is very abundant in Jamaica, growing to a large size, and thrives well in the savanas, but most luxuriantly in the deep, rich brick mould of that island. This tree was very early introduced into England, where it sometimes is known to flower; from which circumstance it may be inferred that it would prosper in favorable localities in some of our Southern States, and probably mature its fruit.

There is, perhaps, only one species of this genus; but the West Indian tamarind, believed to be only a variety, differs so much from the East Indian, in the form of its fruit and the number of its seeds,

that it is regarded by some as specifically distinct.* The pods of the West Indian variety are from two to five inches long, containing from two to four seeds; but those from the East Indies are almost twice as long, and contain from eight to twelve seeds. The seeds in both are roundish, somewhat angular, flattened, hard, polished, with a central circumscribed disc at each side, and lodged in a quantity of soft pulp. When ripe, the pods are of a dull-brown color.

In Jamaica, the pods, or fruit, are gathered in June, July and August, according to their maturity. They must be fully ripe, which is known by their fragility, or easily breaking on a slight pressure between the finger and thumb. The pulp and seeds are first taken out of the pods, and cleaned from fragments of shells, placed in casks, in layers, and the boiling syrup from the sugar-house is poured in just before it begins to granulate, till the cask is filled; the syrup infuses itself into every part of the tamarinds, quite to the bottom, and when cooled, the cask is headed for sale. Sometimes a superior article is made with clarified syrup, which imparts to the fruit a more agreeable taste. The East Indian tamarind differs from that of the West Indies, not only in the size and form of the fruit, but in its relative sweetness. The former are preserved without syrup or sugar, being simply cured with salt. Those employed for domestic use are merely dried in the sun.

The Frankincense or *Olibanum Tree* (Boswellia serrata) is indigenous to the mountains of Central India, where it is known under the name of *Sali*, and as producing the olibanum of commerce, or the gum frankincense of the ancients. It is a lofty tree, with the foliage crowded at the extremity of the branches, and is frequent in the forests between the Sone and Nangpur, from which circumstance it may be inferred that it would be adapted to the soil and climate, in favorable locations, in some of our Southern States.

* *Correction.*—It may here be stated that the account of the Tamarind Tree, as growing in Virginia, which appeared at page 321 in the Agricultural Report of the Patent Office for 1854, is incorrect. Doubts were expressed at the time the statement was received as to the probability of such a circumstance, for it was believed that the climate of Virginia was too severe for the successful growth of this fruit in the open air. I will only add, that the tree in question proves to be the "Honey Locust," (*Gleditschia triacanthos.*) which grows wild in abundance in Louisiana, Mississippi, Kentucky, and Tennessee, and is sparingly produced east of the Alleghanies, from Pennsylvania to Florida. Its fruit consists of flat, crooked, pendulous pods, from twelve to eighteen inches in length, of a reddish-brown color, the pulp of which, for about a month after maturity, is very sweet, but, in a few weeks after, becomes extremely sour. Formerly, sugar was extracted from these pods, and a beer was made from them by fermenting the pulp while fresh.

Olibanum distils from incisions made in the bark of the tree during the summer months, occurring in the form of semi-transparent masses, or tears, of a pale-yellowish or pink color, solid, hard, and brittle. It has a bitterish acrid taste, and, when chewed, sticks to the teeth, and renders the saliva milky. When heated, it burns brilliantly, and diffuses an agreeable odor, in consequence of which, in the early ages, it was much used as incense in the sacrifices, and, in modern times, the Greek and Roman Catholic churches still retain the use of frankincense, in some of their ceremonies. It is seldom employed for other purposes, except as a perfume in the rooms of the sick, although other gums bearing that name are in more general use, and are by many regarded as identical with it; for instance, Lamarck designates the gum of the Amyris gileadensis by this name; Forskal and Sprengel, that of the Amyris kataf; while Linnæus erroneously thus denominates the resin of the Juniperus lycia.

The Balsam of Gilead Tree (Amyris gileadensis) is a native of Arabia, and grows spontaneously in the mountains of Yemen. Although not indigeneous to Judea, it was cultivated with great perfection many years before Christ, in the gardens of Jericho, on the banks of the Jordan; and it is from Gilead, in that country, whence the merchants brought the resinous product to Egypt, that is derived the appellation of "Balsam of Gilead."

This shrub, or tree, which seldom exceeds fourteen feet in height, has a trunk eight or ten inches in diameter, with many spreading, crooked, purplish branches, having protuberant buds, loaded with aromatic resin. The great value set upon this drug in the East is traced to the earliest ages. When Alexander the Great was in Judea, a spoonful of the balsam was all that could be collected on a summer's day; and, in the most plentiful year, the great royal park for these trees yielded only six gallons. It was consequently so dear that it sold for double its weight in silver. That of the best quality is said to exude naturally, but the inferior kinds of the present day are extracted by boiling the branches. It is at first turbid and white, of a strong, pungent, agreeable, aromatic odor, and of a slightly bitter, acid taste; upon being kept it becomes thin, limpid, of a greenish hue, then of a golden yellow, and at length of the consistency of honey. This balsam is highly prized among Eastern nations, particularly by the Turks and Arabs, both as a medicine and an odoriferous unguent and cosmetic. It has been highly extolled as a powerful anti-septic, vulnerary, and preventive of the plague. Its great scarcity, however,

has prevented it from coming into use among European and American practitioners. It is extremely liable to adulteration, and, from its high price, and difficulty to be obtained, it is believed that not a single ounce of the genuine article can be found in this country, nor even in Europe.

The Eygptian Gum-Arabic Tree, (Acacia vera,) which affords the finest gum-arabic of commerce, is a native of the sandy deserts of Arabia, Egypt, and the western parts of Asia; it also grows abundantly in Barbary and other parts of Africa, particularly in the Atlas mountains. In Morocco, or Barbary, where this tree is called *Atteleh*, it rises to a height of several feet, having a crooked stem, covered with a smooth grey bark, while that of the branches is of a yellowish-green, or purplish tinge. At the base of the leaves, there are two opposite awl-shaped spines, growing nearly erect, and having a slight, glandular swelling below. The wood is hard, and takes a good polish. Its seeds, which grow in a hard coriaceous pod, resemble those of the lupine, yield a reddish dye, and are used by tanners in the preparation of leather.

The gum exudes spontaneously from the bark of the trunk and branches of the tree, in a soft or nearly fluid state, and hardens by exposure to the air, or to the heat of the sun. The more sickly the tree, the more gum it yields; and the hotter the weather, the more prolific it is. A wet winter and a cool or mild summer are unfavorable to the crop. It begins to flow in December, immediately after the rainy season, near the time of the flowering of the tree. Afterwards, as the weather becomes hotter, incisions are made through the bark, to assist the exudation of the juice. The gum, when new, emits a faint smell, and when stowed in the ware-house, it may be heard to crack spontaneously for several weeks; and this cracking is the surest criterion of new gum, as it never does so when old.

Several kinds of gum, yielded by different trees, are occasionally to be met with, but that which is commonly substituted for it is brought from the Island of Senegal, on the coast of Africa, and is called "Gum Senegal."

The Mastic Tree (Pistacia lentiscus) is a native of the south of Europe, the Levant, and the west of Asia, and probably could be cultivated with success in California, and perhaps in some parts of the South. This tree, which seldom exceeds twelve feet in height, with a trunk ten inches in diameter, is covered with a smooth, brownish bark, and produces the resin known in commerce under the name of "mastic." It is cultivated in various parts of Continental Europe, particularly in Italy and Portugal, but no resin is said to flow from it in

those climates. The culture is very simple, and is attended with but little trouble, consisting of nothing more than keeping the surface of the soil clean. It does not require any pruning, but, on the contrary, the cultivators endeavor to prevent the trunk from growing in a handsome form. The more crooked the stem, the greater the yield of resin. In the island of Chios, the officinal mastic is obtained most abundantly by making transverse incisions in the bark, from which the resin exudes in drops, and, hardening on the trees, or running down and concreting on the ground, is thence collected for sale or use. The time chosen for making these incisions is about the beginning of August, when the weather is dry. In the course of the following day, the mastic begins to appear in drops, which continue to exude till the end of September. Cloths are frequently spread under the trees, so that the mastic, which falls, may not be intermixed with impurities or earth.

The Quassia Plant, (Quassia amara,) a native of Surinam, is a beautiful shrub, or low tree, the roots, bark, and wood of which afford the true officinal quassia of commerce. This plant is sufficiently hardy to withstand the summer climate of England, where it flowers freely for several months, from which circumstance it is believed that it would succeed well in favorable localities in our Southern States.

Aside from its use as a bitter tonic, in materia medica, it is asserted that the brewers in England have, of late years, used quassia-wood instead of hops. Beer made with it, however, does not keep well, but soon becomes muddy and flat, has a mawkish taste, and runs into acetous fermentation. Consequently, it is less nutritious and wholesome than that which is properly hopped. This wood, from its narcotic power, is also used to poison flies.

The Egyptian Senna Plant (Cassia senna) grows spontaneously in Syria, Arabia, and Upper Egypt, and is cultivated in Italy, the West Indies, and other parts of the world, for its leaves, which form a considerable article of commerce. This shrub has also been grown in England, but, as it is an annual, it becomes necessary to sow the seeds early in the spring, in a hot-bed, which adds much to the labor and expense of its cultivation.

This plant rises with a somewhat woody, erect, branching stem, to a height of about two feet. The leaves, which form the true senna of the shops, are green, without any yellowish cast. It is stated that, at Cairo, the traders mix the leaves of other plants with those of the true senna, in the proportion of 500 parts of the *Cassia lanceolata*,

a valuable acquisition, not only to the list of our ornamental, but to that of our valuable timber trees. This lofty and very graceful object is a native of the Himalayas, Nepal, Kamaon, and of regions as far north as Cashmere, at elevations of from 7,000 to 12,000 feet above the level of the sea, where it attains a great altitude, even surpassing in dimensions the cedar of Lebanon, rarely falling short of a height of one hundred and fifty feet, with a trunk thirty or more feet in circumference. Its wood is described as of first-rate quality, being compact, resinous, highly fragrant, of a deep rich color, which has been compared to that of a polished brown agate. It is also of the most durable nature, instances being on record where its timber, employed in the roofs of buildings, was found perfectly free from decay after a period of upwards of two hundred years; and pieces of it from the Zein-ul-kadal bridge, in Cashmere, proved but little decayed, although exposed to the action of water for four hundred years.

The loftiness and spreading branches of this tree accord admirably well with the description given of the cedar in Holy Writ, but not with the "Cedar of Lebanon" of the present day. Its wood, which is regarded as almost incorruptible, from its hardness and the fineness of its grain, perhaps, could be as easily wrought as that employed in the construction of Solomon's Temple. The principal difficulty, with reference to its being identical with the cedar mentioned in the sacred writings, is, that it has never been found on, nor near, Mount Lebanon; yet it might have formerly grown there in abundance, and subsequently disappeared, and given place to another species, as is frequently the case in many parts of the globe in modern times. It is regarded by the Hindoos as a sacred tree, and, in some places, is highly venerated, never being used, except to burn as incense on occasions of great ceremony; but, in others, it is employed for the purposes of construction, as a valuable timber tree.

In addition to the superiority of its wood, the deodar is highly ornamental, and sufficiently hardy to thrive in any part of the United States south of the Delaware, except at great elevations. Much encouragement has recently been given to its propagation in England, for its timber. Several thousand bushels of the seeds were imported some four years ago from India, by the way of Egypt, and placed in the hands of reliable nurserymen, to cultivate, on condition that they should return one-half of the product to the government at the expiration of three years. By this means, upwards of a million seedlings of this valuable tree have been added to the wealth of the

kingdom, many of which, at some future day, may prove subservient to the purposes of construction or the defence of the country. Would not this example be worthy the imitation of our own government, by establishing plantations of the deodar, as well as of the live-oak, in favorable localities, at accessible points along the seaboard of our Middle and Southern States? No branch of agriculture claims a stronger degree of public attention than the planting of timber, which, in the present state of our country, would form the true basis of national prosperity, in preserving its peace and perpetuity by the strength and permanency of its naval force. Though, in times of peace, a great number of ships of war may not be deemed necessary, yet the old adage is true: "He who has his sword by his side, seldom wants to use it." With equal force we are impressed with the wise admonition of Galgacus, the brave leader of the Caledonians, who flourished in the first century: "Think of your ancestors; think of posterity."

In conclusion, whether we consider the suggestions herein offered as agriculturists or economists, or as moralists and patriots; whether we look to their effects on the wealth, happiness, and perpetuity of our Union; we cannot fail to cultivate and cherish the enterprise, and ever regard it as a sacred duty.

Very respectfully, your obedient servant,

D. J. BROWNE.

Hon. CHARLES MASON,
Commissioner of Patents.

DOMESTIC ANIMALS.

INFLUENCES OF THE CHANGE OF SOIL OR CLIMATE ON ANIMALS, AND OF THE VARIATION OF THEIR FOOD.

BY D. J. BROWNE.

Of the domesticated quadrupeds, which man transports to every part of the habitable globe, and subjects to various kinds of management, both in regard to heat and cold, moisture and dryness, as well as to labor and nourishment, it cannot be denied that considerable changes are manifested in their form, contour, size, color, and secretions; but these, in general, are merely superficial, the animals being greater or less in bulk, with longer or shorter limbs and horns, or even an entire absence of the latter, having a larger or smaller mass of fat on the shoulder or rump, or being covered with a coat of finer, coarser, thicker, or thinner hair, down or wool; still, these differences, when proper care is taken to prevent crossing, usually continue for a long period in those races or breeds that have been transported to countries remote from those in which they were originally produced. They also depend upon determinate circumstances, and their extent increases or diminishes in proportion to the intensity of the causes which occasion them.

Upon these principles it has been observed that the most superficial characteristics are the most variable. Thus, color depends much upon light; thickness of hair or wool, upon heat or cold; and size, form, or the secretion of milk, upon the scarcity, abundance, or quality of food. It is not to be understood, however, that these variations constitute the differences in the races or varieties of our domestic breeds, but that they have long existed with similar forms and habits as at present, either acquired and accumulated through a series of generations, which, in the course of time, have become hereditary, or that they have ever retained their original and typical castes from their earliest progenitors.

In respect to the effects produced by the change of food and climate on our domestic animals, I would cite the instance of the horse: given in the Agricultural Report of the Patent Office for 1854. If the London "Dray" be conveyed to Arabia and subjected to the

same influences as the native horses of that country are exposed, in the course of a few generations, he will present the leading characteristics of the Arabian horse. The head will gradually diminish in size, the limbs will become fine and clear, the massive proportions of the whole body will disappear, and not only will the external form of the native be acquired, but, aside from this, something also of the chivalrous disposition or spirit. Again, if the race thus improved be conveyed back to the central or northern parts of Europe, it will gradually deteriorate, and, in the course of some generations, will assume all its original proportions. These facts would tend to prove that the Arabian horse cannot long exist in perfection in the cool, humid climate of Britain; and the influences arising indirectly from that cause are regarded as the principal reasons of the change. It has also been ascertained that the large coach horses of Leicestershire, in England, when carried to some parts of Yorkshire, where the pasturage is more sparse, degenerate and become small; and that the "Pad" and saddle horses of the last named county, when brought to Leicestershire to breed, change into a fleshy animal with large heavy limbs.

There is also another class of interesting facts connected with this subject: If sheep are carried from either of the temperate zones to the burning plains of the tropics, after a few years, material changes take place in their covering. The wool of the lambs, at first, grows similar to that in the temperate climates, but rather more slowly. When in a fit state for shearing, there is nothing remarkable about its quality, and, when shorn, it grows out again as with us; but, if the proper time for shearing be allowed to pass by, the wool becomes somewhat thicker, falls off in patches, and leaves underneath, a short, close, shining hair, exactly like that of the goat in the same climate, and wherever this hair once appears there is never any return of wool. Numerous facts of a similar nature have also been observed in other animals; For instance, in the Cashmere goats which have been brought down from the mountains of Thibet to Kanour, in British India, where the mean annual temperature is but 65° F., the down, or undervest, of their wool, that grows in colder climates directly under their fine, long, silky hair, wholly disappears the first year.

In pursuing the subject still further, it may be stated, that the horned cattle originally taken to the Pampas, beyond Buenos Ayres, by the earliest Spanish settlers, have undergone a most singular modification of the bones of the head, consisting of a shortening of those of the nose together with the upper jaw. This race, or breed, called *ñiata*, externally appear to hold a similar relation to other cattle as the bull-dog does to other dogs, their foreheads being very short and broad, with the nasal end turned up, and the upper lip much drawn back; the lower jaw projects beyond the upper, and has a corresponding upward curve, in consequence of which the teeth are always exposed to view. From their very open and high-seated nostrils, short heads, and protuberant eyes, when standing or walking, they assume a most ludicrous, self-confident air. It may further be remarked, that their hinder legs are rather long, when compared with the foremost ones, which adds to their awkwardness, by bringing their heads near to the ground.

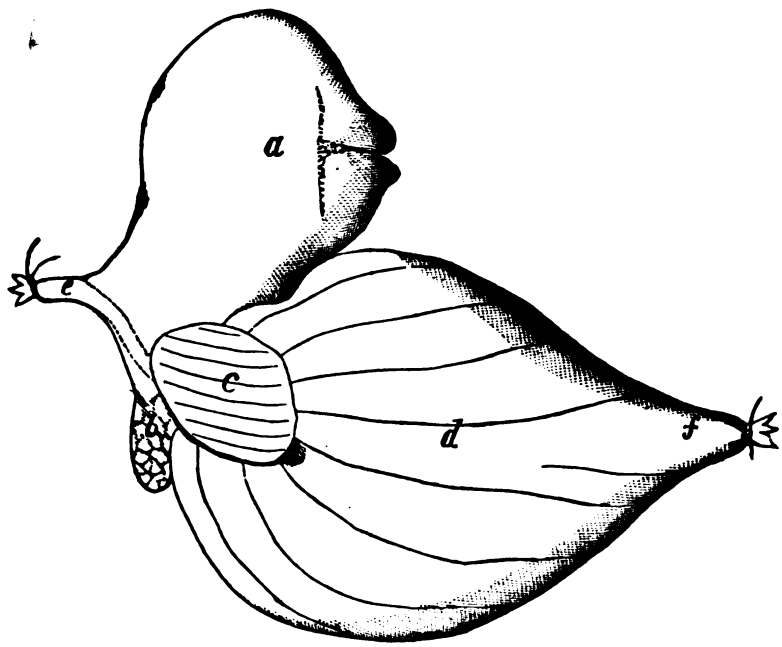
It is also a notable fact, that cattle reared for several generations on rich soils, as those in the West Riding in Yorkshire, in England, become very large and fat, and are distinguished by the shortness of their limbs, while, in drier or colder situations, their whole bulk is less, and their legs are more muscular and strong, which powerfully verifies the truth of the axiom in breeding that, "Good cattle are coincident with good soil," and are never found as a race on a bad one, as is manifested on the Isle of Skye, on the west coast of Scotland, where the cows, when exposed to the rigors of winter are often reduced to mere skeletons in the spring, many of them not being able to rise from the ground without help, but recover as the season becomes more favorable to the production of grass. Then they acquire new flesh, which is both tender and sweet. The fat and lean are not so much separated in them as in the beef reared further south, but are interlarded, as it were, which renders the meat very agreeable to the taste.

In New Granada, and other inter-tropical countries, the cow also undergoes another remarkable physical change: she furnishes a supply of milk no longer than the period her calf is running by her side; when it ceases to suck, the milk immediately dries up. This, doubtless, is owing in a great degree to the high temperature of her blood and the increased flow of perspiration, which are generally manifested in all cattle of the warmer portions of the torrid zone.

In arriving at the more immediate object of this paper, I would offer a few observations on the character of some of the internal and external structures of the organs of animals, chiefly those of ruminants, in order to arrive at a knowledge of them as indications of their capacity for fattening and reaching an early maturity. Let it first be stated that the chief utility of rumination, as applicable to all the animals in which it takes place, and the final purpose of this wonderfully complicated function in the animal economy, are still imperfectly known. Whatever may be our ignorance of its object or cause, it is certain that the nature of the food has a considerable influence in augmenting or diminishing the necessity for the performance of that function. Thus, dry food requires to be entirely subjected to a second mastication before it can pass into the third and fourth stomachs, while a great portion of that which is moist and succulent, passes readily into those cavities on its first descent into the second stomach. It may here be remarked that in the young calf, and also in the lamb, we find the fourth stomach considerably the largest, being fully developed, while the other three are but imperfectly so. This arises from the fact of the nutriment on which the young animal subsists (its mother's milk) being in so matured a state as to require comparatively but little exertion for the organs of digestion. The other three stomachs, therefore, are not required until the young ruminant begins to crop the crude herbage or to feed upon dry fodder or hay, when the digestive apparatus gradually becomes developed.

When a calf or lamb commences feeding upon solid food, then it begins to ruminate; and, as the quantity of solid aliment is increased, so does the size of the first stomach increase until it attains its full dimensions. In the latter case, the first stomach has become

ably larger than the other three cavities taken together. as modification of this organ to adjust itself to the altered on of the animal is beautifully shown in the instance now consideration, the nature of which will be easily understood by ence to the accompanying diagrams, giving the exact relative tions of the different cavities of the stomach to each other in oung calf, and in the adult cow.

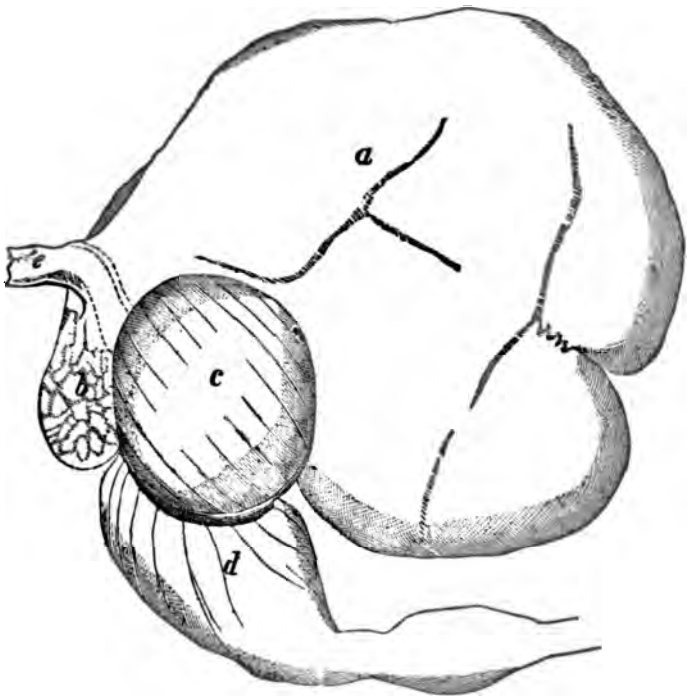


The four stomachs of a Calf, with their relative proportions.

The letter *a*, denotes the first stomach, or paunch; *b*, the second stomach, or honey-comb bag; *c*, the third stomach, or many-plies; *d*, the fourth stomach, or reed; *e*, a portion of the œsophagus, as connected with the first stomach; *f*, the pylorus, or opening into the intestines.

A knowledge of the above-named facts has taught the intelligent breeder that care must be taken to feed the calf at first with the milk of its own dam, which, at the time of its birth, is of a peculiar character, and acts as a gentle purge, indispensable to its health at this critical period, but which would be hurtful at a later stage of its growth. In order to preserve its thriftiness and health, it should have an abundance of new milk, warm from the cow for the first two or three weeks, after which, it may be gradually trained to eat more substantial or solid aliment, alternately with new milk, sweet clover hay, Indian meal, or the best grass the farm can afford, until completely weaned. If fed entirely upon milk, until the time of weaning, it is obvious that the fourth stomach of the calf would be un-

able to receive and perfectly digest the recently swallowed herbage or hay, without its having previously undergone the process of rumination; and that each of the other three stomachs would be quite as unprepared to perform its proper functions until the fourth had become sufficiently developed to perform its part. Hence, if a calf be suddenly changed from a diet consisting purely of milk to one wholly of grass



The four stomachs of an adult Cow, with their relative proportions.

or hay, a suspension of healthy functions must necessarily take place, which will ever after more or less affect its successful growth. While on this subject, it may be stated that there is a great diversity in the milk of cows, which is increased by many circumstances, such as her age, the condition she is in, the proximity or remoteness of the time of her calving, and, above all, the manner in which she is fed. It frequently happens that, of cows, not only of the same breed, but even those which are the offspring of the same parents, fed on the same farm, and in the same manner, the one will yield more milk than the others. Cows too old or too young also give less milk than those of middle age. A lean cow never gives so much milk as one in good condition. Cows generally give more milk for a few weeks after they have calved than they do at any other time. The food with which they are fed has a powerful influence on the milking properties of all cows; and the mode in which they are reared has a considerable effect on their capacity to give milk. A cow reared on bad or indifferent pasture and scanty subsistence will

never turn out so good a milker as one reared on pasturage which is sweet and rich. From these and other circumstances, it is not easy to determine the average quantity of milk given by a herd of cows.

The health of an animal depends chiefly on the supply of nutriment which it receives being equal to the waste that is going on in its body. Healthy adults weigh as much at the end as at the beginning of the year; and this depends on their having had sufficient food to supply the waste which has been going on in the system. In young and growing animals, it is somewhat different. They require a larger supply of nourishment than there is waste, because their bodies are constantly increasing in size, which arises chiefly from the activity of their respiration and nutrition even from the moment of their birth. Milk, the food that nature supplies them with at this period, is well adapted to assist the functions of organic life, which are now more active than in adults. Its chief ingredients are nitrogenized matter, (casein,) and phosphates, for developing the system, and carbonised materials (butter and sugar) for supplying animal heat. The casein, or cheesy matter, is the nitrogenous principle, and affords nourishment to the muscular and other tissues; the phosphates principally are expended in the formation of hair and bones, and are also necessary for the healthy functions of the body; and the butter and sugar are the materials, which, by their combustion, supply heat to the body. Thus in milk, we have all that is necessary for the growth of the young animal, and it is the type and representative of all food; for, unless an aliment contains the principles of milk, it is not fitted for the promotion of the health and perfect development of the body. And, besides, the stomachs of young animals are not adapted for extracting the nitrogenous principles from food, and the casein of milk is supplied to them ready separated. In the young ruminant, as the calf, the first three stomachs, as before stated, into which the food of the adult animal enters before it is digested, are not used at all. The milk passes at once into the fourth stomach. Hence the necessity of weaning these animals gradually, in order that their stomachs may be fully able to prepare the raw food for digestion. A large quantity of the casein in milk is required for the rapid development of the body; and the butter, a highly carbonised material, is required for supporting a large amount of animal heat. Consequently, it is a bad thing to feed calves on skim-milk, as both the butter and casein have been removed in the shape of cream. Earl Spencer, of England, who was very successful in weaning his calves, fed them first with new milk, and then with skim-milk and meal, the latter supplying the necessary nitrogen and nitrogenised materials. In feeding young animals, they should have good food, and there should be no stinting them as to quantity.

In the growth of young animals, as well as the fattening of adult ones, it has been found by experience that all exposure to cold should be avoided as much as possible, as a low temperature diminishes the vitality of the system, and whatever decreases vitality gives a preponderance to chemical action in the body, and injury of some kind or other will be the result. Exercise is also necessary for the rearing of young animals, although it should be avoided in fattening. In

order to develop a calf or a lamb, it should be allowed plenty of exercise; but, in fattening, another object is to be gained. All motion consumes something in the body, which is the cause of the loss of so much material in the fattening of the animal. In a similar manner, exposure to cold is also an absolute loss. The primary cause of all this waste is the increased supply of oxygen to the lungs; for, whatever increases this supply, tends to the waste of the body and the necessity for a supply. Where much exercise is allowed to milch cows, the produce of butter is small, which arises from the oxygen consuming the carbonaceous material that would otherwise be secreted in the milk in the form of butter or cream. With regard to the pastures which produce the most casein, or cheese, it has generally been found that they are poor. It has also been conjectured that the exercise which the cows take on poor pastures, in order to obtain their food, tends to increase the development of the casein in their milk. Furthermore, it has been observed that stall-fed cows yield much more butter and less cheese than those fed in pastures, or that are allowed to run at large when fed upon hay. It may be stated, however, that the richness and flavor of milk depend much upon the nature of the food of the cow.

In reference to the size and structure of the internal organs of animals, as tending to their capacity for fattening or reaching an early maturity, it may be stated that large livers and lungs indicate a general coarseness of muscle and bone; and hence may be regarded as signs of incapacity for taking on fat. It is supposed by some that, all animals with large, broad, round chests fatten best, and that they have small lungs; but this is found not to be the case, for horses have narrow chests and large lungs. Southdown sheep have narrower chests than the Leicester breed, yet they have the largest lungs; but the Leicesters are known to fatten sooner. Again, it is a prevailing opinion among butchers that the fattest cattle have both small livers and lungs. This, it will be conceived, must be a necessary consequence, according to the principles just laid down. In all cases where there is the most oxygen taken into the system there is the greatest destruction of carbon, and consequently less carbonaceous material deposited in the form of fat. If two bullocks had the same quantity of food, and one of them had lungs of double the capacity of the other, that bullock would only appropriate half as much of his food in the formation of fat. Milk, containing much butyraceous matter, it is well known, is produced by cows with small lungs. The same holds good with regard to the liver; for, where there is a large liver there must of necessity be a large secretion of bile, and consequently a large destruction of carbonaceous matter. Thus, if two animals were to eat 100 pounds of food, and one were to secrete 60 pounds of bile, and the other only 40 pounds, the food that was not formed into bile would be converted into fat; hence the gain on the animal with a small liver.

With regard to external signs, small bones indicate a delicacy of constitution in an animal as well as smallness of liver and lungs, which shows a tendency to fatten rapidly; while, in an animal with large ears, which are usually accompanied by a general coarseness

and largeness of bone and muscle, the reverse is the case. The "mellow feel" of an animal depends on the rebounding of the cellular tissue, in which is deposited the fat. Where there is much mellowness, it arises from the blood being easily pressed from one part of the cellular tissue to another, and indicates a susceptibility to fattening. The chief reason why animals get more rapidly fattened at the end of their feeding season is, that the fat accumulating in the abdomen presses upon the diaphragm and abdominal muscles, thus preventing the more complete action of the lungs, and consequently the destruction of carbonaceous materials by the inhalation of oxygen. The fat also prevents the oxygen from being absorbed by the skin, and diminishes by its pressure the capacity of the liver, and thus also adds to the fattening process. To similar causes may be ascribed the fact that fattened animals take on more flesh on their hindmost quarters than on those before.

The foregoing views accord in a singular manner with many well-established facts connected with the rearing and fattening of stock; but, as it is impossible in this short essay to treat of the subject in all its abstruse and interesting course of reasoning, it must necessarily be deferred.

HORNED CATTLE.

THE POINTS BY WHICH LIVE CATTLE MAY BE JUDGED.

Were an ox of fine symmetry and high condition placed before a person not a judge of live stock, his opinion of its excellencies would be derived from a very limited view, and consequently from only a few of its qualities. He might observe and admire the beautiful outline of its figure, for that might strike the most casual observer. He might be pleased with the tint of its colors, the plumpness of its body, and the smoothness and glossiness of its skin. He might be even delighted with the gentle and complacent expression of its countenance. All these properties he might judge of by the eye alone. On touching the animal with the hand, he could feel the softness of its body, occasioned by the fatness of the flesh. But no man, not a judge, could rightly criticise the properties of an ox further. He could not possibly discover, without tuition, those properties which had chiefly conduced to produce the high condition in which he saw the ox. He would hardly believe that a judge could ascertain, merely by the eye, from its general aspect, whether the ox were in good or bad health—from the color of its skin, whether it were of a pure or cross breed—from the expression of its countenance, whether it were a quiet feeder—and from the nature of its flesh, whether it had arrived at maturity or not. The discoveries made by the hand of a judge might even stagger his belief. He could scarcely conceive that that hand could feel a hidden property—the touch—which of all tests is the most surely indicative of fine quality of flesh, and of disposition to fatten. It can feel whether that flesh is of the most valuable kind; and it

can foretell the probable abundance of fat in the interior of the carcass. In short, a judge alone can discriminate between the relative values of the different points, or appreciate the aggregate values of all the properties of an ox. The parts of the ox by which it is judged, let it be remembered, are called "points."

Thus it may be seen that a person even totally ignorant of cattle may judge of some of the most apparent properties, or points, of a fat ox; but were a lean one placed before him, he would be quite at a loss what opinion to pass on its present, and far more of its future, condition. The outline of its figure would to him appear rugged and angular, and consequently coarse. To him the body would feel as a number of hard bones, covered with a tough skin and coarse hair. A judge, on the other hand, could at once discover the good or the bad points of a lean as well as of a fat ox; because the properties of the former are the same in kind, though not in degree, as those of the latter; and, in accordance with the qualities of these points, he could anticipate the future condition of the lean ox, save and excepting the effects of accidents and disease.

But, it may be asked, if the qualifications of a judge of cattle may be so easily acquired as is here represented, how is it that the opinion of a judge is always held in deference, and is always referred to in cases of difference of opinion? This question admits of a very satisfactory answer: Errors in the judging of cattle arise not so frequently from not knowing the points to be judged of, as from judges attributing to one or more of their favorite points too great an influence over the future increasing condition of the ox; and as long as there are so many points to be considered, and as most of them may be partially altered by local circumstances, a difference of opinion may exist among judges of lean stock.

Now, what are those points of an ox, a thorough knowledge of which is so essential to constitute a perfect judge? Could they be described and illustrated with such precision as that they might be applied at once to every ox, in whatever condition he might be, a great advancement would be made towards establishing fixed rules for the right judging of all the domestic animals. Fortunately, nature has herself furnished rules for ascertaining points for judgment, a knowledge of which can nevertheless be only acquired by careful observation and long and constant practice.

The first point to be ascertained in examining an ox is the *purity* of its breed, whatever that breed may be, which may be ascertained from several marks. The color or colors of the skin of a pure breed of cattle, whatever those colors are, are always definite. The color of the bald skin on the nose, and around the eyes, is always definite, and without spots. This last is an essential point. When horns exist, they should be smooth, small, tapering, and sharp-pointed, long or short, according to the breed, and of a light color throughout in some breeds, and tipped with black in others. The shape of the horn, however, is a less essential point than the color.

The second point to be ascertained in an ox is the form of its carcass. It is found that the nearer the section of the frame of a *fat* ox, taken longitudinally vertical, transversely vertical, and horizontally,

approaches to the figure of a parallelogram, the greater quantity of flesh will it carry within the same measurement. That the carcass may fill up the parallelogram as well as its rounded form is capable of filling up a right-angled figure, it should possess the following configuration: The back should be straight from the top of the shoulder to the tail. The tail should fall perpendicularly from the line of the back. The buttocks and "twist" should be well filled out. The brisket should project to a line dropped from the middle of the neck. The belly should be straight longitudinally, and round latterally, and filled at the flanks. The ribs should be round, and should project horizontally, and at right angles to the back. The "hooks" should be wide and flat; and the rump, from the tail to the hooks, should also be flat and well filled. The quarter from the aitch-bone to the hook should be long. The loin-bones should be long, broad and flat, and well filled; but the space between the hooks and the short-ribs should be rather short, and well arched over with a thickness of beef between the hooks. A long hollow from the hooks to the short-ribs indicates a weak constitution, and an indifferent thriver. From the loin to the shoulder-blade should be nearly of one breadth, and thence it should taper a little to the front of the shoulder. The neck-vein should be well filled forward, to complete the line from the neck to the brisket. The covering on the shoulder-blade should be as full out as the buttocks. The middle ribs should be well-filled, to complete the line from the shoulders to the buttocks along the projection of the outside of the ribs. These constitute all the points which are essential to a fat ox, and which it is the business of the judge to know, and by which he must anticipate what the lean one, when fed, would realise. The remaining points are more applicable in judging of a lean than a fat ox.

The first of the points in judging of a *lean* ox is the nature of the bone. A round, thick bone indicates both a slow feeder, and an inferior description of flesh. A flat bone, when seen on a side view, and narrow, when viewed either from behind or before the animal, indicates the opposite properties of a round bone. The whole bones in the carcass should bear a small proportion in bulk and weight to the flesh, the bones being only required as a support to the flesh. The texture of the bone should be small-grained and hard. The bones of the head should be fine and clean, and only covered with skin and muscle, and not with lumps of fat and flesh, which always give a heavy-headed, dull appearance to an ox. The fore-arm and hock should also be clean and full of muscle, to endure travelling. Large joints indicate bad feeders. The neck of an ox should be, contrary to that of the sheep, small from the back of the head to the middle of the neck. The reason of the difference, in this respect, between the ox and the sheep is, that the state of the neck of the ox has no effect on the strength of the spine.

A full, clear and prominent eye is another point to be considered; because it is a nice indication of good breeding. It is always attendant on fine bone. The expression of the eye is an excellent index of many properties in the ox. A dull, heavy eye certainly indicates a slow feeder. A rolling eye, showing much white, is expressive of a

restless, capricious disposition, which is incompatible with quiet feeding. A calm, complacent expression of eye and face is strongly indicative of a sweet and patient disposition, and, of course, kindly feeding. The eye is frequently a faithful index to the state of the health. A cheerful clear eye accompanies good health; a constantly dull one proves the probable existence of some internal lingering disease. The dullness of eye, arising from the effect of internal disease, is, however, quite different in character from a natural or constitutional phlegmatic dullness.

The state of the skin is the next point to be ascertained. The skin affords what is technically and emphatically called the "touch"—a criterion second to none in judging of the feeding properties of an ox. The touch may be good or bad, fine or harsh, or, as it is often termed, hard or mellow. A thick, firm skin, which is generally covered with a thickset, hard, short hair, always touches hard, and indicates a bad feeder. A thin, meagre, papery skin, covered with thin silky hair, being the opposite of that just described, does not, however, afford a good touch. Such a skin is indicative of weakness of constitution, though of good feeding properties. A perfect touch will be found with a thick, loose skin, floating, as it were, on a layer of soft fat, yielding to the least pressure, and springing back towards the fingers like a piece of soft, thick chamois leather, and covered with thick, glossy, soft hair. Such a collection of hair looks rich and beautiful, and seems warm and comfortable to the animal. It is not unlike a bed of fine soft moss, and hence such a skin is frequently styled "mossy." The sensation derived from feeling a fine touch is pleasurable, and even delightful, to an amateur of breeding. Along with it is generally associated a fine symmetrical form. A knowledge of touch can only be acquired by long practice; but, after it is once acquired, it is of itself a sufficient means of judging of the feeding qualities of the ox; because, when present, the properties of symmetrical form, fine bone, sweet disposition, and a purity of blood, are the general accompaniments. These are the essential points of judging lean cattle; but there are other and important considerations which must claim the attention of the judge, in forming a thorough judgment of the ox.

The proportion which the extremities bear to the body and to each other, is one of these considerations. The head of the ox should be small, and set on the neck as if it appeared to be easily carried by the animal. This consideration is of great importance in shewing cattle to advantage in the market. The face should be long from the eyes to the point of the nose. No face can be handsome without this feature. The skull should be broad across the eyes, and only contract a little above them, but should taper considerably below them to the nose. The muzzle should be fine and small, and the nostrils capacious. The crown of the head should be flat and strong, and the horns should protrude horizontally from both sides of it, though the direction of the growth from the middle to the tip varies in the different breeds. The ears should not be large, but should stand a little erect, and be so thin as to appear translucent when exposed to the sun. The neck should be light, tapering from the front of the shoulder and neck-vein, with a gradual rise from the top of the shoulder to the

head. The length of the neck should be in proportion to the other parts of the animal; but this is a non-essential point, though an apparently short neck would be preferred to a long one, because it is generally well covered with the neck-vein. A droop of the neck, from the top of the shoulder to the head, indicates a weakness of constitution, arising frequently from breeding too near akin. The legs below the knee should be rather short than long, and clean made. They should be placed where they apparently bear the weight of the body most easily, and should stand wide asunder. The tail should be rather thick than otherwise, as thickness indicates a strong spine and a good weigher. It should be provided with a large tuft of long hair.

The position of the flesh on the carcass is another great consideration in judging of the ox, the flesh on the different parts being of various qualities. Those parts called the "spare-rib," "fore" and "middle ribs," "loins," and the rump or "hook-bone," are of the finest quality, and are generally used for roasts and steaks. Consequently, the ox which carries the largest quantity of beef on these points is the most valuable. Flesh of fine quality is actually of a finer texture in the fibre than coarse flesh. It also contains fat in the tissue between the fibres. This arrangement of the fat and lean gives a richness and delicacy to the flesh. The other parts, though not all of the same quality, are used for salting and making soups, and do not command so high a price as the parts just described.

A full twist lining the division between the hams, called the "closing," with a thick layer of fat, a thick flank, and a full neck-vein, are generally indicative of tallow in the interior of the carcass; but it frequently happens that all these symptoms of laying on internal fat fail. The disposition to lay on internal fat altogether depends on the nature of the individual constitution; for it is often observed that those animals which exhibit great fattening points on the exterior do not fill with internal fat so well as others which want these points. On the contrary, thin-made oxen, with flat ribs, and large bellies, very frequently produce large quantities of internal fat.

The first part which shows the fat in a feeding ox, is the point or top of the rump, which, in high-bred animals, is a prominent point; sometimes it protrudes too much, as the mass of fat laid on these is out of proportion to the lean, and therefore useless to the consumer. This is the part which frequently misleads inexperienced judges in the true fatness of the ox, because fat may be felt on this part when it is very deficient on most of the other points.

The parts, on the other hand, which are generally the last in being covered with flesh, are the point of the shoulder joint, and the top of the shoulder. If these parts are, therefore, felt to be well covered, the other and better parts of the animal may be considered "ripe." Ripeness of condition, however, can only be rightly ascertained by handling, for there is a great difference between the apparent and real fatness of an ox. The flesh of an apparently fat ox to the eye, may, on being handled by a judge, feel loose and flabby; but a truly fat ox always feels "hard fat." With such, the butcher is seldom deceived, while loose handlers give no assurance of killing well.

It is proper, in judging of the weight of a fat ox, to view his gait while walking towards you, which, if he has been well fed, will be accompanied with a heavy rolling tread on the ground. In this way, a judge can at once come very near to its weight.

The application of all these rules and considerations to the judging of lean stock, constitutes the chief difficulty to the judge. An ox in high condition, in so far as its condition alone is under consideration, can be judged of, as we have seen, by any one; and sometimes the fatness may be so great as obviously to deform the symmetry to any observer. The superiority of a judge to others, in these cases, consists in estimating the weight, observing the purity of the blood, and valuing the points of the animal. But in judging of a lean ox, its future condition and symmetry must be foreseen. These rules, if studied practically, will enable an inquiring observer to foresee these points; and, in judging between a number of valuable points, it should be remembered that purity of breeding will always insure aptitude to fatten, which, in its turn, will insure the largest remuneration for the food consumed. D. J. B.

DEVON CATTLE.

The "Devon," or rather "North Devon" cattle, chiefly produced in the county from which they take their name, are of great antiquity, and have been celebrated and justly admired for centuries, for their pleasing color, elegant form, gentle temper, active gait, and other good qualities, which fit them beyond all other breeds for the cart or the plough, if not for the excellence of their milk and flesh. Their color is generally a light red, but varying a little, either darker or more yellow, seldom having any white, except about the udder of the cow, or the belly of the bull, which is little seen, or, perhaps, a few white hairs towards the extremity of the tail. On the whole, there is scarcely any breed so rich and mellow in its touch, so silky and fine in its soft, long hair; added to which, it has a greater proportion of weight in the most valuable joints, consuming at the same time less food in its production.

It is to the grazier, then, that this breed is more especially valuable, as few if any others will rival them in disposition to fatten and in the quality of the flesh. Generally speaking, the cows are inferior to many others for the purposes of the dairy, but not as respects the quality of the milk; for they yield more than an average proportion of cream and butter, both of which in Devonshire are proverbially known. Some farmers, however, have found them to yield even a large produce of milk, so that in this particular much may depend on the choice of pasturage, or the manner in which they are kept. The general average of the dairies is one pound of butter a day for each cow, during the summer months, or as long as they are well fed.

This breed will bear transferring to inferior soils, as well as to colder and more exposed situations, without suffering in the slightest degree. Thus upon the bleak coast of Norfolk, and upon light and inferior pastures, they are found to thrive remarkably well, and to sustain their flesh upon very indifferent keeping.

For working purposes, the Devons are unequalled, and no description of cattle can be compared with them, either for quickness of steps or endurance of "pluck." There is almost as much difference in working between these oxen and those of other breeds, as there is in a light, cleanly, active cart-horse, and the heavy, hairy-legged sluggish dray. In Devonshire, they are usually put to labor at from two to three years old, according as they are wanted, and worked until they are five or six years of age, when they are quickly fattened for the butcher. Four young and two old bullocks are required to plough an acre a day upon heavy land, but on light soils they will do more. In Norfolk, these oxen are also extensively used at the plough, one pair being employed in the forenoon from six till eleven o'clock, and another pair from one till six in the evening. In this manner, they will generally plough upon turnip soil, one acre and a half in a day. It is no uncommon thing, however, for a three year old bullock to work in a plough alone, and if well kept, he will perform without difficulty all through the spring. But when the weather becomes warm he will suffer very much if worked longer than five or six hours at a time. In hoeing ridged turnips or mangold wurzel, with a single plough, or horse-hoe, two steady bullocks, one at a time, will walk over five acres in a day; but to do this, they must work about eleven hours in a day instead of ten. After a little practice, they are preferred to horses, as they are easily managed and turn at the ends without trouble, scarcely injuring a single root.

For feeding purposes, the Devons possess every qualification to fatten, being celebrated for the fineness of their flesh and the lightness of their offal; and, although they do not attain so great a weight as some other breeds, they will fatten at a very early age. They may be made quite fit for the butcher when twenty-seven or thirty months old, and will weigh at that age from 560 to 700 pounds. If kept until three years old, or a little longer, they may easily be made to weigh from 700 to 840 pounds.

The period at which the working Devons are fattened greatly varies. A favorite old bull is frequently worked too long, and it then requires both additional time and quantity of food; but, generally speaking, a certain number are fed off each year, and fresh ones are broken in to supply their places. These old oxen, when well fed, attain a good weight, frequently weighing from 1,120 to 1,260 pounds. In this case, however, they are immense consumers, and will devour daily, when first put to turnips, 5 or 6 bushels, besides other food.

For certain districts, the Devons must be considered most valuable animals, being hardy and easily kept upon the most scanty herbage on poor soils. Their rich milk and fine quality of flesh, combined with their unrivalled working qualities, are becoming more appreciated than formerly, and they are increasing in importance both in Europe and in this country, amongst the other breeds.

CHARACTERISTICS, OR POINTS, OF THE DEVON.

The North Devon bull has a bold countenance, indented forehead, clear, full and prominent eyes, surrounded by an orange-colored ring; his head is square, with a light cream-colored muzzle, or nose; his horns are moderately strong, a little turned up at their tips, and of a wavy color; his back is straight from the hip-bone to the insertion of the tail; his hind quarter is full and round quite down to the hough, with the thigh full of muscles, and a deep, rich flank; his shoulder is also deep and strong from the withers to the chest, and thick through the breast behind the elbow; his fore-arm and knee are thick and strong, with the bone small and short under the knee; his flank is well down the body, which is rather straight underneath.

The cow has a neat, sharp head, with graceful, upturned horns, a very full, clear eye, encircled with an orange-colored ring, and she is of the same color within the ears; the muzzle, or nose, is narrow, and of pale cream color; her frame is long and straight, symmetrical in shape, with good prominent hips and full springing ribs; her hind-quarter is long and full; her shoulder round, slanting and full, and she is deep from the top of the plate-bone to the breast-point; her fore-arm thick down to the knee-bone, and thin and short below the knee; her abdomen is straight along the under-side; her flank is low down near the hough; she is usually small when compared with the bull.

The North Devon working ox has a large, long, straight and symmetrical frame, with a clean, sharp-looking head, clear, prominent eye, encircled by an orange-colored ring, a cream-colored nose, and long, waxy, upturned horns, which are fine at the points; his shoulder is slanting and well placed; his neck is lean and thin at the breast-point; his ribs are rounded and spring out; his hip is high and long from the hip-bone to the insertion of the tail, and nearly as high as the line of the back; hind-quarter round and full, quite to the hough, with great substance and bone; fore-arm, thick and large above, but small below the knee, with a good, expansive solid hoof.

D. J. B.

THE CATTLE OF RUSSIA.

The rearing of domestic animals in Russia forms an important part of its agriculture, properly so called, and goes hand in hand with the raising of grain. If the one branch of husbandry declines, the other suffers; and their prosperity greatly depends on a good distribution of productive soil; or, in other words, on a due proportion of pastures, meadows, and arable lands. The length and severity of their winters, which abridge the season of pasturage; the frequent droughts, which render the hay harvests less abundant; and the want of other

kinds of prepared fodder, which in many countries supply the inadequacy of the natural pasturage—all of which circumstances, when combined, place their husbandry in an exceptional position, and require a larger extent of meadow land than is elsewhere necessary to place the rearing of cattle in a normal relation to the culture of the soil. But in Russia, it has been found that this branch of rural industry is not always in proportion to the advanced state of the culture of the soil. In many of those provinces, where the number of cattle and horses raised is large, their quality is very inferior. They are small in size and meagre in the production of milk and flesh. It is only in districts where cultivation is considerably advanced that the two branches, agriculture proper and the rearing of domestic animals, are rationally combined, and progress at an equal pace. In a large proportion of the steppes, (a region corresponding to our prairies, and embracing nearly a fifth of the total area of European Russia,) where cattle and horses remain at pasture the whole year round, a black humus prevails, and the soil is hence so fertile as to demand no other manure, and its culture is often so easy that the surface scarcely requires even to be scratched by the plough. The dung of the animals goes to waste, or, in some parts, is consumed as fuel. In other sections of the country, however, there are such vast differences—as, between North and South—between the regions of the steppes and the provinces of the centre—between the latter and the governments of the West—that we cannot consider their systems of rural economy under one point of view, nor apply to them in a general manner the principles derived from the experience of other countries.

In the greater part of those districts where there are few meadows, and the culture of artificial provender is neglected, it is usual to leave the animals upon open pasture until the cold becomes excessive and the ground is covered with snow, when it is often necessary to feed them upon straw. In the steppes, where meadows and good pasturage abound, the rearing of these animals is left to the care of Providence. For the want of building timber, it is impossible to house them in winter, except in the vicinity of rivers, where sheds of cane are constructed for the purpose. In other districts, they put stacks of hay around the spot where the cattle are fed, which afford some protection against the frosts and drift. It is evident, then, that, under such rude husbandry as this, improvements in feeding or breeding, and sanatory precautions against epizoötic diseases, are alike out of the question.

The unsatisfactory condition in which this important branch of rural economy is found in some parts of Russia has long attracted the attention of the government, and several inquests have been made with the view of ascertaining in those localities the causes of this state of things and devising a remedy. These causes may be summed up as follows: Degeneration, resulting from want of care in the selection of breeds; in some provinces a deficiency of good herbage; frequent murrains and other epidemic diseases, which, of themselves, are the result of bad nourishment, or of the state of abandonment in which the animals are left during the winter; the want of good veterinary surgeons; and, finally, the small profit that can be derived in

some districts from cattle rearing, in consequence of a want of a market for meat, milk, butter, or cheese.

The products of the dairy in Russia are not very considerable, but might become important as articles of commerce, if more care were observed in their preparation, and they were made to keep better and to be more conformable to the taste of foreign consumers. There are many districts, it is true, where local circumstances are unfavorable to cheese-making; but there are also many others where the sole impediment consists in carelessness. Of this, no better proof need be sought than the fact that several proprietors, who have bestowed on the dairy the attention it deserves, have been perfectly successful. Among other cases, an instance is cited of a gentleman of Wologda, who brought Swiss dairy people to conduct the manufacture of cheese upon his estate, and now derives an annual income from that source of $3,750 to $4,500. In the Baltic provinces and in Finland, as well as in some other districts, the manufacture of cheese has for some time past been progressing well. It is also found that, among the provision dealers of St. Petersburg and Moscow, imitations of foreign cheese of different sorts are sold, which, though inferior, resemble it sufficiently to be put off under the names of "Gruyère" and "Duke of Gloucester" cheese.

The preparation of salted butter is less dependent than that of cheese upon local circumstances. Requiring only care and cleanliness, it might anywhere succeed to some extent; and yet but little of it is produced.

The annual amount of tallow exported from Russia is estimated at 13,746,480,000 pounds, and an equal quantity, including mutton tallow, is presumed to be used for home consumption in the manufacture of soap, stearine, candles, &c.

The most remarkable races of cattle in Russia may be enumerated as follows:

The "Ukraine," Wallach, or Podolian; Little Russia; Donian; and the Black Sea breeds. All these denominations are local; but the original character, which nearly resembles that of the Hungarian race of cattle, has been preserved. They are distinguished for their strength, adaptation for field labor, and facility of taking on flesh and fat. The latter singularity consists in the fat not growing so much on the outside, but penetrating the flesh itself, rendering it juicy and more delicate, especially when the beeves have been fed in the rich prairies of the Caucasian line. It is for this reason that butchers in large towns give preference to this beef over that of the other cattle. The cows, however, yield but little milk. This breed is to be found from Podolia to the Ural, but the finest type is found at Karlowka, in the government of Poltawa. It is also met with in some places in the province of Ekathérinoslaw, near the river Samara, and further northward in the provinces of Little Russia, but of not so fine appearance, from the want of good keeping.

The "Kalmik" breed is intermediate between the Ukraine and Russian races. It is of small size and fine flesh, and is able to endure any change of climate. All the year round, such cattle can live on

the steppes, and during winter subsist on grass, which they obtain from under the snow, except when, after rain has fallen and the snow is frozen, they cannot break through the ice, and are deprived of food. In many districts of country on the Don, the inhabitants prefer this race to the Ukraine, though they are less valuable for the purposes of the dairy and for labor.

The "Russian" race, properly so called, has no peculiar characteristics, as its original type is not easily to be distinguished. In general, the cattle of this race are ill-shaped, diminutive in size, and not well reared. They are found in the middle, northern and westtern provinces, where they are kept for their milk. In the province of Wologda, and in the vicinity of St. Petersburg, this race is improving from better management.

To the above races may be added the "Lithuanian" breed, which is small, but strongly built, giving an abundance of milk.

Among the foreign races introduced into Russia is the "Cholmogory" breed, of Dutch origin, distinguished by its fine form and good milking qualities. It is found pure only in the districts from which it takes its name, in the government of Archangel. The heavy bodies of the oxen render them unfit for labor. In general, the cows require good keeping and great care, so that the expenses of their support are rather excessive, which must be redeemed out of the proceeds of their milk.

The "Foigtland" race, introduced into some districts of the Baltic provinces, is remarkable for its medium size and fine appearance. The cows content themselves with a rather common food, and give plenty of milk. The oxen are well adapted for work.

The "Frisland" race begins to be multiplied among the Menonite settlers of Molotchan. The cows produce a fair yield of milk.

The Tyrolese, Scotch and English breeds have been introduced and acclimatised in the provinces of the Baltic. The Swiss breed is extensively diffused, as is also the Tyrolese, in the kingdom of Poland.

A cross between the Cholmogory and the indigenous breeds is also found in some districts of the government of Archangel, as well as those of Wologda, Kalouga, Twer, Kostroma, Jaroslaw, and in the districts near the capitals.

The crossing of foreign races with each other, especially of the English, Tyrolese and Swiss breeds, has often been attempted, but seldom with success. As a general rule, cattle of foreign origin do not acclimatise well in Russia, except in the districts where the herbage is good. These breeds require more care and better food, and likewise yield more readily to epidemics, than those long accustomed to the country. The Dutch and Tyrolese breeds appear to have succeeded best; but the English cattle seem to be least adapted to the Russian climate as well as to its food.

The divisions of Russia in Europe, with the number of cattle, the quantity of arable land, the quantity of meadow land, and the population of each, together with the quantity of arable and meadow land to each inhabitant, in 1851, are indicated in the adjoining table.

D. J. B.

Provinces and governments of Russia in Europe.	Number of cattle.	Dessiatines* of arable land.	Dessiatines of meadow land.	Rural population.	Dessiatines to each inhabitant
Archangel	95,200	80,000	157,000	224,800	1.1
Astrakhan	231,780	150,000	800,000	155,300	6.1
Bessarabia	570,510	1,300,000	1,200,000	755,400	3.3
Courland	231,700	496,000	314,000	465,800	1.7
Don Cossacks	1,168,740	2,310,000	9,540,000	778,000	15.2
Ekathérinoslaw	495,680	1,200,000	1,400,000	906,600	2.9
Esthonia	126,480	240,000	260,000	273,600	1.8
Finland	.....	520,000	1,071,000	1,472,500	1.1
Grodno	247,600	1,470,000	520,000	786,700	2.5
Jaroslaw	502,250	1,200,000	492,000	881,800	1.9
Kalouga	361,900	1,300,000	193,000	882,200	1.7
Kazan	361,980	2,100,000	500,000	1,311,100	2.0
Kharkow	584,050	2,100,000	1,350,000	1,048,600	3.3
Kherson	765,620	1,400,000	2,000,000	701,300	4.8
Kiew	567,390	2,353,000	445,000	1,534,200	1.8
Kostroma	591,990	1,600,000	340,000	1,005,800	1.9
Koursk	428,550	2,503,000	613,000	1,612,200	1.9
Kowno	458,420	2,060,000	750,000	887,300	3.2
Livonia	324,070	415,000	555,000	740,200	1.3
Minsk	450,610	2,820,000	1,546,000	910,400	4.8
Mohilew	587,370	1,700,000	300,000	783,100	2.6
Moscow	292,940	1,300,000	260,000	1,132,500	1.4
Nijni-Nowgorod	235,000	1,800,000	280,000	1,100,700	1.9
Nowgorod	517,920	1,300,000	470,000	857,500	2.1
Olonetz	93,150	370,000	110,000	261,600	1.8
Orel	427,620	2,400,000	400,000	1,276,400	2.2
Orenburg	1,284,080	4,115,000	4,452,000	2,071,700	4.1
Penza	256,380	1,600,000	450,000	990,000	2.0
St. Petersburg	162,830	550,000	200,000	553,000	1.4
Perm	615,150	2,589,000	1,993,000	1,816,900	2.5
Podolia	406,660	2,440,000	773,000	1,510,600	2.1
Poland	1,540,000	5,445,000	1,500,000	4,372,000	1.6
Poltawa	691,130	2,000,000	1,215,000	1,558,000	2.1
Pskow	191,250	1,400,000	800,000	630,800	3.5
Riazan	338,370	1,800,000	300,000	1,294,700	1.6
Saratow	884,650	2,530,000	6,513,000	1,679,000	5.4
Simbirsk	622,820	2,500,000	1,600,000	1,091,200	3.7
Smolensk	667,560	2,000,000	280,000	1,029,500	2.2
Stavropol	631,200	750,000	4,000,000	960,800	4.9
Tambow	501,090	2,500,000	1,650,000	1,573,900	2.6
Tauride	694,150	750,000	1,600,000	550,800	4.3
Toula	314,380	2,000,000	220,000	1,023,800	2.2
Tschernigow	254,150	3,191,000	630,000	1,291,700	3.0
Twer	670,550	1,670,000	1,290,000	1,324,600	2.2
Wiatka	741,170	2,973,000	500,000	1,885,100	1.8
Wilna	369,640	1,170,000	335,000	743,500	2.0
Witebsk	245,880	1,600,000	120,000	658,900	2.6
Wladimir	439,745	1,800,000	280,000	1,100,600	1.9
Wolhynia	412,400	2,110,000	777,000	1,389,800	2.1
Wologda	479,250	800,000	450,000	825,300	1.5
Woronèje	784,800	3,007,000	2,400,000	1,585,550	3.3
Total	24,917,805	89,777,000	60,194,000	56,257,350	

* A dessiatine is nearly 2.7 acres.

CONDENSED CORRESPONDENCE.

Statement of D. L. R. BUTT, *of Centre, Cherokee county, Alabama.*

Our beef cattle generally run in the "range," until a month or so before killing. They are then fed at a cost of about $3 a head per month.

The market value of beef is on an average, 3½ cents a pound.

Statement of T. L. HART, *of West Cornwall, Litchfield county, Connecticut.*

Formerly, cattle were kept here through the winter with very little protection except a crooked rail fence; but, at present, very few good farmers build a barn without a cellar in which all their animals are stabled at night and in stormy weather. There is much economy in this, both in the amount of fodder they consume, and in the better condition of the entire herd in the spring.

We have among our cattle a breed which have been kept on the same farms for at least one hundred years. They have not only been crossed with the other old breeds of this section, but with the Devons and Short-horns, and still retain most of the peculiar characteristics of the originals. Our best cattle, however, are crosses between the common breeds and the Devons.

Statement of D. BARNES, *of Middletown, Middlesex county, Connecticut.*

Cows are in high estimation with us, as milk and butter always command high prices, and find a ready market.

Good milch cows are worth from $40 to $100 each.

Statement of GEORGE P. NORRIS, *of New Castle, New Castle county, Delaware.*

Most of the cattle of this county are of the common breed. Some attention has been paid to the introduction of Devons, which, however, are not much in favor. A considerable portion of our beeves, which are purchased from the Western drovers, are stall-fed, and will compare favorably with those from any section of the Union.

Good cows are scarce, and $60 is not an unusual price for a good milker of the common grade.

Statement of C. W. BABBITT, *of Metamora, Woodford county, Illinois.*

The farmers in this section are making considerable effort to improve their cattle by crossing with the Durhams and other popular breeds.

In rearing calves, I would recommend that, for the first two weeks after birth, they be allowed all the new milk they want, and then taught to eat corn-meal. If a box or trough be provided, sheltered from the rain, to which they can have free access, and it be kept constantly filled with meal occasionally mixed with a little salt, with two quarts of new milk, twice a day for each calf for some four months, with a good pasture for them to run in, they will yield the farmer more profit in the end than if managed in any other way.

A likely bullock, or steer, of common stock, three years old, is worth $25. A good cow with a young calf is valued at something more. Beef is bringing $4 50 per hundred.

Statement of ALEXANDER HERON, *near Connersville, Fayette county, Indiana.*

Next to swine, cattle in this section are the most profitable stock to raise. It is somewhat difficult to estimate the cost of rearing them as they are turned out to pasture in summer and fed during the winter on various kinds of fodder. Each animal is expected to thrive upon an acre of good grass. After the first year, the total cost of rearing may be estimated at $20, leaving a net profit of $15 a head at three years old. Those who stall-feed of course expend more in the rearing, and receive a larger return. When grain is fed to them until they are about four years old, the profits are nearly equal to those of hogs.

Large numbers of Short-horned cattle have been introduced into this county from Kentucky, and are much preferred by the butchers to the old breeds.

The value of a bullock, at one year old, may be estimated at $8; at two years old, at $20; and at three years old, at $35. The cost of transportation to New York, per head, by railroad, by the way of Buffalo, is $14. The cost of driving to Cincinnati is $2 a head.

Statement of BENJAMIN F. ODELL, *of Plum Spring, Delaware county, Iowa.*

The cattle of this county are mostly of the common breed. The cost of raising until three years old, is about $20, at which age steers are worth from $25 to $50, and heifers from $20 to $30 each. Oxen are worth from $75 to $150 a pair; calves from $8 to $15 each.

Statement of L. E. DUPUY, *of Shelbyville, Shelby county, Kentucky.*

The best cattle we have in this region are the imported Durhams and their crosses. The cross upon our indigenous stock improves the latter fifty per cent. The value of a good calf, at weaning time, is about $10. The increase in value is $10 or $15 a year. The cost of keeping is from $5 to $10 per annum.

Statement of SAMUEL J. FLETCHER, *near Winchester, Clark county, Missouri.*

Stock, in general, in this county, are very badly treated, being fed merely on straw and late-cut prairie grass, with no cover to shelter them during the inclement season. I consider a cross from the Durham breed the best, being fine milkers, good workers, and profitable for the butcher. A promising bull calf from the "Clay" stock, at six months old, is worth about $35, while one of the common breeds is valued at only $5 or $6.

For seven or eight months in the year, our luxuriantly rich prairie grass furnishes such excellent pasturage, that I have sold steers to the butchers, giving 650 pounds of prime beef at three years old. Prairie grass, when cut early and salted, also makes excellent hay.

Statement of J. W. JONES, *of Knob Noster, Johnson county, Missouri.*

Cattle, in this county, are raised with a considerable profit. The Durham breed, crossed with our common cows, is preferred to any other, which is worth about as much at three years old as the common breed is at four.

The price of a bullock at one year old is about $9; at two years old, $15; at three years old, $20; and at four years old, about $25.

Statement of W. B. GIDDINGS, *of Middle Grove, Monroe county, Missouri.*

The cattle raisers of our county have turned their attention for the last few years to the improvement of the breed. They have brought a great number of Short-horns from Kentucky, and a few from Ohio. Either pure-blooded or mixed animals are diffused throughout this section of the State. They are considered superior to any other breed, notwithstanding they require richer and higher feeding than our common stock. When crossed with our ordinary cows, the progeny serves excellently well for labor, milk or flesh.

Stock cattle one year old are worth $12; at two years old, from $16 to $20; at three years old, from $25 to 30; at four years old, from $35 to $40. Milch cows are worth from $20 to $30 each, and $18 when farrow or dry. Beef at home is worth from $5 25 to $5 50 per hundred.

Statement of D. R. STILLMAN, *of Alfred Centre, Alleghany county, New York.*

There are no pure-bred cattle in this section, although there are some high grades of Short-horns which materially improve the old breeds for beef without detriment to their milking qualities. Calves are usually weaned when two or three months old, when they are turned out to grass. The first winter, they are fed with hay and a

little meal or roots. The second and third winter they are kept mainly on straw, and the autumn following are sold directly from the pasture, as the fattening of cattle here for the butcher is not extensively practised.

The cost of raising a bullock to three years old is about $7 a year, at which age he will bring from $25 to $40. The cost of transportation to New York, by railroad, when there are more than one, is $13 17 each.

Statement of GERSHOM WIBORN, *of Victor, Ontario county, New York.*

Our old race of cattle is nearly extinct. In color they were black, brindled, or speckled; they had hollow backs, cat hams, and lopped horns. There were among them, however, many noble specimens of working oxen, bullocks, and milch cows. Our present cattle consist of crosses of the old race with the Devons, Durhams, and Herefords. They are still improving, running more and more into the Durham, for the reason that this breed for beef and milk is held in the highest favor.

Milch cows are high, selling from $30 to $50 a head. A good pair of working oxen will bring from $125 to $160 a pair. The price of fat cattle is governed by the New York market, to which they are sent by railroad, at about $4 each.

Statement of JOSEPH HAINES, JOTHAM S. HOLMES, JOHN A. HOWE, OLIVER GREEN, Jr., *and* A. F. DICKINSON, *Committee of the Farmers' Club Bedford, Westchester county, New York.*

The rearing of horned cattle has not been followed heretofore to much extent in this section, our supplies having been obtained almost entirely from other parts of the country. But, in consequence of the increased value of late, it is now receiving more attention. A good demand has always existed with us for veal calves for New York market, so much so, that a fat calf from four to eight weeks old would sell for as much as it would at a year old, treated in the ordinary way, say from $10 to $15. Indeed, the demand has been so great, for a few years past, that buyers are in search of them at a much younger age, at prices from $1 to $4 a head. A common price has been from 4 to 6 cents a pound, live weight.

The kind of stock now most profitable for us to raise is cows, as they are in great demand for milk dairies for the supply of the New York market. The cost of raising will average at one year old about $12, valued also at $12; at two years, $20, valued at $25; and at three years old, $30, and valued at $30 or $45 each. The cost of transportation to New York by railroad is about $1 50 a head.

We find the Devons to be the best stock for labor, or their cross with other breeds.

Statement of E. MATCHAM, *of Pittsfield, Lorain county, Ohio.*

There is great improvement being made in crossing blooded stock on our common cattle in this county. There has been kept, quite a number of Devons, Durhams, and Herefords for breeding, and recently the Ayrshires have been introduced.

The Devons or their cross on our best common cows make fine oxen, of good size, active and tractable, of a beautiful red color, which command high prices. Steers are raised to three years old, without much grain, for $20 or $25 a head. They bring, when trained to the yoke, from $80 to $125 a pair.

The cows, when crossed, are fine for the dairy; and by many are thought to excel for this purpose. They certainly make and carry the most flesh when fed on grass, of any cattle raised here; and I think, when fattened for the butcher, they will make as good or a better return for the expenses incurred on them.

Statement of JOHN YOUNG, Jr., *of Forest Grove, Alleghany county, Pennsylvania.*

Neat cattle are raised to a considerable extent in this county, and there is a decided improvement in our stock. The Short-horns, Ayrshires, and Alderneys are considered the best for dairy purposes. Some fine stock is produced by crossing these with the common cattle. Good milch cows this season range from $25 to $50 each. A large majority of the cattle raised in this county are of the common stock, small in size, and without any particular recommending qualities.

The cost of raising to the age of three years is about $15. They were all milkers when two years old; and, besides furnishing our family (twelve in number) with abundance of cream, they yielded last year 925 pounds of butter, of which we sold 690 pounds at 25 cents per pound, amounting to $172 50, or an average of $28 75 to each cow. The surplus milk keeps eight hogs in good condition. The butter and milk used for home purposes fully compensates for the cost of their keeping.

Statement of JAMES MCK. SNODGRASS, *of Mifflin, Alleghany county, Pennsylvania.*

Our stock of cattle is varied. We have the Durham, Ayrshire, and common cattle, with different crosses from each. The cost of raising a heifer till three years old will average $15, and the price at that age is from $15 to $25. Cows at present sell high. Good milkers are worth from $35 to $45. Many of our farmers think that a given quantity of food will produce more meat when fed to half-bloods, or the first cross between the Durham and our common stock, than when fed to full-bloods. Our Pittsburg market takes all the cattle raised in this part of the State, and a large number are also brought from Northern and Eastern Ohio, and elsewhere, to supply the demand.

Statement of C. SNIVELY, *of Penn Township, Alleghany county, Pennsylvania.*

Very considerable attention has been given to the improvement of cattle. Various breeds have been introduced, among them the Durham, Hereford, Devon, Alderney, &c. The Short-horns are held in high estimation, both for their beef and milking qualities. This is the breed most generally sought after.

Statement of D. MINIS, *of Beaver Plain, Beaver county, Pennsylvania.*

Besides the common cattle of this county, there are crosses between them and the Durhams and Devons, those of the former being considered the best for beef and milk. They are generally fed in winter on corn, fodder, and hay.

Butchers pay from $2 to $3 each for calves, four weeks old, and from $12 to $25 for cows. Beef sells for from 4 to 8 cents a pound; tallow, from 10 to 14 cents.

Statement of RICHARD LECHNER, *of Stouchburg, Berks county, Pennsylvania.*

The value of neat cattle here at the age of three years is from $20 to $25 each. Good dairy cows command from $25 to $40 each, being worth from $5 to $10 more in the spring than in the fall.

Statement of ALBERT HOOPES, *of West Chester, Chester county, Pennsylvania.*

Cattle are raised to a considerable extent in this county. We have good animals of all the different improved breeds, each of which has its advocates, and each its peculiar excellencies. The Durhams are best for beef; the Devons for work, and the Alderneys for butter. It is hard to find an animal which does not contain blood of some of the improved breeds.

Statement of J. S. GORE, *of Tippecanoe, Fayette county, Pennsylvania.*

Formerly, the cattle of this county were the most deplorable looking specimens ever seen; but a new era has dawned, some beautiful Devons having been introduced. Still, the large and symmetrical Durham is the first on the list. It is the best milker and the best beef, and grows to an enormous size. It costs about $6 to keep a calf the first year, $8 the second, $10 the third, and $11 the fourth, making $35. Formerly they were worth at that age from $12 to $25. Many of the farmers resorted to having them grazed in the mountains,

where it cost but $1 a summer, during which they lost several head; the cattle were wintered on straw, and some died before spring. But the farmers were satisfied that they cost only $1 a head at the mountains; and the straw had no other value. Our Durham cattle command about $50 a head at two and three years old.

Statement of JOHN B. BRUSH, *of Sheakleyville, Mercer county, Pennsylvania.*

The cost of raising cattle till three years old is $15, which is about the price of good ones at that age. Good cows bring from $20 to $25 in the spring, and from $12 to $15 in the fall. There are men here from the North engaged in the business of breaking steers. Their plan is to build a pen 3 or 4 rods square, of rails. A pair of animals are put in here, and coaxed around quietly for a time, when a bow is hung over their necks, and the same gentle means continued to induce them to walk side by side. When well reconciled to this, they are brought together, and the yoke is then applied. A short whip is now used with judgment, and not with severity, the effort being to teach instead of forcing them. The steers soon understand that they are not to be killed, and yield unresistingly. Three or four-year old animals trained in this manner for six days are sufficiently well broken, provided they are for some time afterward continued at work under a careful driver.

Statement of CHARLES FOSTER, *of Jasper, Marion county, Tennessee.*

The Cumberland mountain, at its summit, presents a beautifully rolling table country, about 40 miles across, at this point, watered with innumerable branches, the heads of the valley streams of this region. The climate is unsurpassed in America. As a grazing region, I know of none equal to it. Indeed, thousands of cattle and hogs are fattened on the range (which is inexhaustible) every year; and, as a general thing, the temperature and other circumstances are such that cattle can be wintered without being fed. I make this statement advisedly, and from positive experience.

Statement of JOHN BROOKE, *of Sherman, Grayson county, Texas.*

The cost of rearing neat cattle till three years old is about $1 50 per head. This is for the attention given to them, as we do not feed them at any season. Some do not even salt them. The price at three years old is from $12 to $15. The value of good dairy cows in the spring is from $15 to $20. Our cattle are not troublesome to break, some working from the first day. They are generally broken in the prairie teams in the spring.

Statement of ROBERT W. BAYLOR, *of Wood End, near Charlestown, Jefferson county, Virginia.*

The raising of cattle is not so profitable as that of horses. A calf will require quite as much attention and about the same amount of feed to rear it as a colt, but will not command in this market, when it is three years old more, than $40 or $50.

The cost of transporting a bullock to Baltimore on foot is $1 25; by railroad, about $6.

We have some of the half-bred "Kaisi" or "Damascus" cattle, raised from the original pair brought to this country by Lieut. Lynch, in 1848, and subsequently presented to this State by Hon. John Y. Mason, then Secretary of the Navy. These animals surpass any others for the yoke I have ever seen. They are of fine size, almost as fleet as horses, perfectly docile and tractable, and haul heavy loads in the hottest weather without lolling like our common cattle. Their gait is quick and brisk, and they will make their trips to market and back as soon as a horse. I am not sufficiently experienced to speak knowingly of the milking qualities of the cows. They have been represented as great milkers in their Eastern home.

We have also imported the Ayrshire, Durham, and Devon, each of which has its peculiar advantages.

Statement of JAMES E. KENDALL, *of Poplar Grove, Kanawha county, Virginia.*

I am of the opinion that our "scrub" breed suits our mountain range the best. The cost of raising cattle is about $3 a year. They sell from $18 to $20 at four years old. Steers, when broken, are worth from $80 to $100 a pair. Mules are raised with as little expense as steers, and are worth from $100 to $150 a head at three years old.

DAIRIES.

CONDENSED CORRESPONDENCE.

Statement of D. L. R. BUTT, *of Centre, Cherokee county, Alabama.*

There is very little more butter made here, than serves for home consumption, though it can be produced in the summer season for about 2 cents a pound. We have a very fine "range" for cattle, and the cost of keeping them during the summer is inconsiderable. Butter is worth in our country markets from 9 to 10 cents a pound.

Statement of JAMES S. WAITE, *of San Gabriel, Los Angelos county, California.*

The dairy business is profitable in this State. I have been more or less engaged in it for the last four years. The first two years, the average price of butter was $1 a pound, and it is now selling for half that price. From ten cows, I have sold as high as $300 worth a month, after having supplied a family of six persons, and allowed the calves from a half to a quarter of the milk from each cow. I came to this State in 1849, and since that time have been engaged in raising stock, the most of which is of the Spanish or Mexican breed. They do not give so large a quantity of milk on an average, as the cows east of the mountains; but their milk is richer, and will make more butter than a like quantity from the latter.

Our process of making butter is to set the milk in pans until the cream rises; then skim, and churn every other day, and wash the butter in cold water until no milk is left to color it; then salt it with an ounce to the pound, and the next day wash it over again, when it is in a condition to be packed down and taken to market.

I think butter would average here 75 cents per pound during the year. Good, gentle, Mexican cows, with young calves, are worth from $40 to $50 each.

Statement of D. BARNES, *of Middletown, Middlesex county, Connecticut.*

Cows are in high estimation with us as milk and butter always command high prices, and find a ready market.

Good milch cows are worth from $40 to $100 each.

Statement of GEORGE P. NORRIS, *of New Castle, New Castle county, Delaware.*

Considerable attention is given to the dairy in this county, the butter being unequalled. At present, it is worth 35 cents in the Wilmington market, and will probably average 25 cents a pound.

Statement of C. W. BABBITT, *of Metamora, Woodford county, Illinois.*

The greater portion of our farmers make more or less butter for sale, and a few are engaged in cheese-making.

Butter has been sold the present season from 10 to 20 cents a pound; cheese at 10 cents.

Statement of D. R. STILLMAN, *of Alfred Centre, Alleghany county, New York.*

The dairy business is a prominent interest in this section. Butter can be made for about 10 cents a pound, and sells from 12½ to 25

cents. Cheese can be manufactured for 5 cents, and sells from 6 to 8 cents a pound. The use of the whey and sour milk for making pork increases the profit considerably beyond the above estimate.

The cost of transportation of butter to New York, by railroad, is 60 cents and that of cheese 44 cents per 100 pounds.

Statement of GERSHOM WIBORN, *of Victor, Ontario county, New York.*

Farmers in this region usually keep from five to ten good milch cows, in order that they may make their butter and cheese for home consumption, besides some to sell.

Butter is worth from 16 to 25 cents a pound, and cheese about half that price. I have a neighbor who keeps from two hundred to three hundred cows and sends his milk 22 miles, by railroad, to Rochester, where it sells from 10 to 20 cents a gallon.

Statement of JOSEPH HAINES, JOTHAM S. HOLMES, JOHN A. HOWE, OLIVER GREEN, Jr., *and* A. F. DICKINSON, *being that portion of their report relating to dairies, to the Katonah Farmers' Club, Westchester county, New York.*

One of the principal products in this county is milk, which finds a ready sale in the city of New York, at an average price of 3 cents a quart, after deducting three-fourths of a cent for transportation. Our manner of taking care of milk and putting it up for market is briefly described as follows:—Vessels, called "cans," or "kettles," used for conveying it to the city, are made of tin, commonly containing 40 quarts each. They are cylindrical in shape, 2 feet in height including the cover, and 13 inches in diameter, strengthened with four iron hoops about 1½ inches wide, covered with tin, with two convenient handles placed about 18 inches above the bottom. Immediately after filling the cans with milk, directly from the cow, they are placed in the water of a spring, where they are kept from 12 to 24 hours before sending to market; and this, too, even, in the hottest weather. It is a fact worthy of notice, that milk treated in this manner, generally arrives in better condition than when sent immediately after being cooled. The covers of the cans should remain off or open until the milk is thoroughly cooled, and it is benefitted by an occasional stirring. Closing the cans tightly after some 10 or 12 hours' cooling, is believed by many to be a good practice in hot weather. A strong or unpleasant flavor in the milk is thought to be sometimes occasioned by closing the cans too soon.

We find for winter that early-made hay is much the best for the production of milk; and, in addition to this, almost any kind of nutritious food which keeps up a good or rather improving condition of the cow is the best.

Butter is manufactured here to some extent, the average price the past season being about 24 cents a pound.

Statement of D. MINIS, *of Beaver Plain, Beaver county, Pennsylvania.*

Milch cows sell in this section from $12 to $20 each, according to quality. The average price of butter is about 15 cents a pound. Cheese is but little made, and sells from 9 to 12½ cents a pound.

Statement of RICHARD LECHNOR, *of Stouchburg, Berks county, Pennsylvania.*

This branch of husbandry is not pursued here to any great extent, as it requires too much land for the pasturage and forage of the cows; or, in other words, it appears not to be adapted to this wheat-growing country. I think, however, it might be made a profitable business if properly attended to.

A good cow will produce 200 pounds of butter per annum; and as high as 11½ pounds have been churned from the milk of a cow in a week. The average price of butter is 17 cents a pound.

Statement of ALBERT HOOPES, *of West Chester, Chester county, Pennsylvania.*

For the dairy in this county, there are good cows of all the improved breeds, but I believe that our best stock is yet to be found among our common cows.

A good cow will make from 200 to 300 pounds of butter in a year, worth from 30 to 35 cents a pound. My dairy of six cows has averaged 230 pounds of butter a year.

Statement of JOHN B. BRUSH, *of Sheakleyville, Mercer county, Pennsylvania.*

There are but few who have large dairies in this county. Every farmer keeps more or less cows and makes some butter. A few make some fine cheese. The price of butter this year is 12½ cents a pound, and ehcese sells for 7 cents.

HORSES, ASSES, AND MULES.

THE HORSES OF FRANCE.

The "Atlas statistique de la production des chevaux" gives some interesting details respecting the method of the administration for obtaining the most correct information with regard to the number and quality of the various races of horses to be found in France. The society, or administration, for the breeding of horses, has divided that country into twenty-seven districts, or circonscriptions, which comprise two breeding establishments, twenty-four depôts for stallions, and one for army horses.

In order to arrive at an exact estimate of the equine statistics, persons especially chosen for the purpose were employed in 1850 to visit every stable, village, and canton in each arrondissement and departement. The result of this census of horses is shown in the annexed table. It comprises correct statistics of eighty-six departements, from three of which, the Seine, Seine-et-Oise, and Corsica, the administration was unable at the time of publication to obtain the results, and had therefore to use the census for 1840:—

Table of the equine statistics of France.

DEPARTEMENTS.	Horses four years old and above.		Mares four years old and above.		Colts three years old and below.		Total.	
	1840.	1850.	1840.	1850.	1840.	1850.	1840.	1850.
Ain	6,837	6,004	7,252	9,220	2,668	2,817	16,777	18,041
Aisne	38,750	36,271	32,966	35,819	11,099	10,403	82,815	82,493
Allier	5,489	5,120	3,378	5,213	1,554	2,438	10,421	12,771
Alpes (Basses-)	2,147	4,660	2,698	2,408	741	1,061	5,586	8,129
Alpes (Hautes-)	1,532	2,512	2,158	774	599	731	4,289	4,017
Ardèche	3,853	3,075	2,360	2,854	427	173	6,640	6,102
Ardennes	24,338	21,726	21,899	23,392	10,686	14,691	56,923	59,809
Ariége	2,983	2,609	5,694	4,778	1,662	2,510	10,339	9,897
Aube	17,055	14,733	15,528	17,385	3,856	8,143	36,439	40,261
Aude	8,878	7,286	9,451	9,305	1,514	4,102	19,843	20,693
Aveyron	2,764	3,451	5,995	5,250	1,005	1,111	9,764	9,812
Bouches-du-Rhône	16,094	11,525	7,729	7,436	999	577	24,822	19,538
Calvados	18,415	19,612	33,763	40,514	7,994	21,740	60,172	81,866
Cantal	2,049	1,233	8,161	6,783	1,322	1,509	11,532	9,525
Charente	8,051	7,035	10,438	12,733	1,272	1,558	19,761	21,326
Charente-Inférieure	10,637	8,383	17,209	22,918	3,592	6,924	31,368	38,225
Cher	13,783	11,355	13,134	12,487	5,868	7,745	32,785	31,587
Corrèze	5,838	4,034	2,664	3,431	528	938	9,030	8,403
Côte-d'Or	24,676	20,911	21,121	22,171	6,964	7,256	52,761	50,338
Côtes-du-Nord	22,431	21,860	51,075	43,383	16,432	31,211	89,938	96,454
Creuse	2,387	2,705	2,745	3,503	1,046	1,531	6,178	7,739
Dordogne	8,046	9,966	5,941	1,429	651	934	14,638	12,329
Doubs	7,783	7,059	8,197	10,672	3,583	7,133	19,563	24,864
Drôme	7,292	7,515	3,129	3,674	746	1,014	11,137	12,203
Eure	36,369	31,980	11,202	9,486	3,580	7,644	51,151	49,110
Eure-et-Loir	28,286	23,886	6,640	10,739	1,866	2,478	36,792	37,103
Finistère	32,645	26,843	50,502	47,112	22,383	23,329	105,630	97,284
Gard	6,734	6,690	3,421	3,571	386	470	10,541	10,731
Garonne (Haute-)	4,783	5,750	9,480	10,201	1,882	3,280	16,145	19,231
Gers	5,495	4,329	10,425	10,013	2,853	3,857	18,773	18,199
Gironde	15,408	18,590	7,643	7,073	2,226	4,173	25,277	29,836
Hérault	4,556	4,642	2,871	3,236	292	525	7,720	8,393
Ille-et-Vilaine	38,491	30,043	18,472	17,286	5,470	17,025	62,433	64,354
Indre	11,560	9,572	7,200	9,265	3,427	3,629	22,187	22,466
Indre-et-Loire	20,983	14,906	5,909	13,106	980	2,896	27,852	30,908
Isère	15,365	14,066	12,714	13,433	2,882	3,783	30,961	31,282
Jura	9,461	8,116	6,779	7,499	2,766	3,610	19,006	19,225
Landes	10,113	6,136	9,598	8,164	3,394	4,860	23,035	19,160
Loir-et-Cher	16,869	16,956	9,512	9,154	3,030	5,436	29,411	31,546
Loire	6,749	5,851	2,096	3,118	533	4,119	9,301	13,088
Loire (Haute-)	2,330	2,280	6,619	5,963	1,583	1,719	10,531	9,962

Table of the equine statistics of France—Continued.

DEPARTEMENTS.	Horses four years old and above.		Mares four years old and above.		Colts three years old and below.		Total.	
	1840.	1850.	1840.	1850.	1840.	1850.	1840.	1850.
Loire-Inférieure	18,880	12,823	16,201	15,252	4,362	4,684	39,443	32,759
Loiret	21,897	20,135	5,728	5,030	1,513	1,716	29,138	26,881
Lot	3,811	2,544	2,695	4,373	415	880	6,921	7,797
Lot-et-Garonne	7,337	5,081	5,323	7,317	1,127	1,147	13,787	13,545
Lozère	2,186	2,112	3,623	3,073	1,200	2,142	7,009	7,327
Maine-et-Loire	17,152	14,437	19,355	26,165	4,640	7,464	41,147	48,066
Manche	22,828	45,303	56,380	34,378	12,603	19,075	91,811	98,756
Marne	32,584	33,503	17,770	18,466	5,213	5,808	55,567	57,777
Marne (Haute-)	19,957	22,674	21,123	20,965	7,350	11,463	48,430	58,102
Mayenne	14,858	12,088	25,126	32,592	10,904	22,508	50,888	67,188
Meurthe	37,837	28,228	22,090	28,166	12,128	16,155	72,055	72,549
Meuse	31,948	29,790	21,156	22,937	10,328	14,096	63,432	66,823
Morbihan	19,354	16,638	17,909	16,636	5,136	5,209	42,399	38,483
Moselle	33,415	28,357	19,587	23,761	10,731	10,874	63,733	62,992
Nièvre	6,614	7,878	6,967	5,908	2,775	2,993	16,356	16,779
Nord	35,122	33,193	33,077	43,161	10,978	17,791	79,177	94,145
Oise	35,771	38,345	15,050	13,701	2,047	2,376	52,868	54,422
Orne	17,185	19,620	27,637	26,300	7,603	25,220	52,425	64,140
Pas-de-Calais	20,543	11,621	45,976	55,160	13,754	20,501	80,273	87,282
Puy-de-Dôme	7,290	6,098	4,892	5,866	885	1,433	13,067	13,397
Pyrénées (Basses-)	7,489	5,394	14,775	17,182	3,040	7,287	25,304	29,863
Pyrénées (Hautes-)	3,580	1,988	8,885	8,511	1,942	3,345	14,377	13,844
Pyrénées-Orientales	3,633	4,012	3,863	3,815	983	1,008	8,479	8,835
Rhin (Bas-)	26,123	20,528	17,472	20,483	6,106	11,512	49,701	52,523
Rhin (Haut-)	13,918	13,210	7,391	10,060	3,290	4,745	24,599	28,015
Rhône	7,846	6,768	1,467	1,915	252	255	9,565	8,938
Saône (Haute-)	11,968	9,580	8,066	8,602	3,382	4,262	23,416	22,444
Saône-et-Loire	8,649	5,974	10,165	6,606	3,903	1,960	22,717	14,540
Sarthe	15,217	18,907	33,083	30,273	7,709	6,652	56,009	55,832
Seine-Inférieure	29,282	26,077	49,219	52,988	8,713	20,920	87,194	99,985
Seine-et-Marne	33,726	33,663	5,198	4,826	1,123	1,016	40,047	39,505
Sèvres (Deux-)	5,904	2,863	23,133	27,328	4,164	5,704	33,201	35,895
Somme	27,586	25,008	37,453	42,170	9,979	19,495	75,018	86,673
Tarn	2,677	2,252	6,327	7,004	1,044	2,182	10,048	11,438
Tarn-et-Garonne	2,915	2,430	4,685	5,480	914	1,179	8,514	9,089
Var	6,903	6,102	3,356	3,857	906	1,422	11,165	11,381
Vaucluse	3,806	4,047	2,805	3,046	488	520	7,099	7,613
Vendée	4,551	3,585	18,997	18,624	5,713	7,481	29,261	29,690
Vienne	7,463	4,045	18,401	20,388	2,040	3,762	27,904	28,195
Vienne (Haute-)	3,593	4,465	4,592	5,985	710	864	8,805	11,314
Vosges	10,516	16,735	15,321	16,457	6,946	16,006	42,783	49,198
Yonne	15,670	19,427	10,248	12,004	2,245	8,231	28,163	39,662
Total	1,197,812	1,091,734	1,168,145	1,232,772	347,505	554,426	2,713,462	2,878,932
Corse	6,332	No returns for 1850.	5,681	No returns for 1850.	4,816	No returns for 1850.	16,829	No returns for 1850.
Seine	21,240		15,003		28		36,271	
Seine-et-Oise	46,246		5,402		286		51,934	
Total	1,271,630		1,194,231		352,635		2,818,496	

If we take the two columns for 1840 and 1850, which contain the census of eighty-three departements, we obtain the following result:

CATEGORY.	Census of 1840.	Census of 1850.	Difference in favor of 1840.	Difference in favor of 1850.	Diminution.	Increase.
Horses of four years and above.	1,197,812	1,091,734	106,078	.....	8.86 pr. ct.	.....
Mares of four years and above.....	1,168,145	1,232,772	.....	64,627	.....	5.53 pr. ct.
Colts of three years and under.....	347,505	554,426	.....	206,921	.....	59.54 pr. ct.
Total.....	2,713,462	2,878,932	106,078	271,548		
Difference in favor of 1850.....			165,470			6.1 pr. ct.

It will be observed that the census of 1850 reveals the fact of the diminution of the number of horses of four years old and above, and the increase of mares and colts. It is to be expected, however, that the horse, being more exclusively employed in labor and more exposed, should perish more readily than the mare; but it must also be concluded, from the great increase of colts, that more general attention has been directed of late years to reproduction.

The table below shows the statistics of the horses of France as determined by the administration from 1831 to 1850, inclusive:—

Years.	Number of establishments.	Number of stallions.	Average of five years.	Number of mares covered.	Average of five years.	Average of stallions.	Average of five years.
1831	21	959		31,939		33.30	
1832	21	909		30,685		33.76	
1833	22	975	944.40	32,269	30,322	33.10	32.11
1834	23	959		29,489		30.75	
1835	23	920		27,226		29.59	
1836	23	835		27,124		32.48	
1837	23	838		25,852		30.85	
1838	23	835	855.00	29,338	29,586	35.14	34.37
1839	23	878		33,364		38.00	
1840	23	889		31,252		35.15	
1841	23	869		31,718		36.50	
1842	23	919		37,561		40.87	
1843	23	985	997.60	41,958	42,440	42.60	42.54
1844	23	1,070		49,906		46.64	
1845	23	1,145		51,057		44.59	
1846	25	1,162		57,785		49.73	
1847	25	1,186		59,651		50.30	
1848	25	1,252	1,226.80	56,101	58,819	44.81	47.94
1849	25	1,255		58,689		46.76	
1850	26	1,269		61,869		48.75	

The above figures demonstrate with sufficient clearness the progress and utility of these establishments. The advantages they afford, in improving the breeds generally, as well as in giving increased value to the animals in an economical point of view, are already appreciated by the French, and naturally lead to the suggestion of adopting a similar system in the United States for the improvement of the horses of our army, as well as for other purposes. If a depôt for stallions of approved breeds were established by the government in each State and Territory of the Union for public use, free of charge, incalculable benefits would doubtless accrue to the country, and in less than ten years, the improvement and increased value of the horses would be immense.

In the Atlas herein referred to, each district, or circonscription, in France, has its particular map, on which are indicated the chief places for race-courses, and the principal breeding stations of every arrondissement and departement in its territory. It also contains beautiful lithographic sketches and portraits of the prominent races of horses actually shown as at work, as well as an account of the equine statistics, and the character of the breeds of each district, an arrangement which is exceedingly ingenious, and greatly facilitates the appreciation and understanding of the subject. D. J. B.

THE HORSES OF RUSSIA.

As far back as the historical accounts of Russia extend, the rearing of horses seems to have always formed a notable branch of the national industry. The warlike and nomadic habits of the ancient population; the increasing demands for the supply of the numerous cavalry and artillery of a large army; the immense distances, requiring a large amount of animal labor, as well for the conveyance of produce and merchandize as for locomotion, all combined, have stimulated the development of this branch of rural economy, favored as it is over a large portion of the empire by the great extent of good pasture lands. Accordingly the Russians possess excellent horses for all uses.

The introduction of a regular and rational system of horse-breeding in Russia, however, dates only from the reign of Peter the Great, who opened a new era for this branch of industry. He caused the steppes in the vicinity of Woronèje to be supplied with Dutch stallions, to which the famous "Bitioughine" draft horses owe their origin; while Prince Menschikoff established at Bronitsi, and on the Pakhra, no less celebrated studs, which furnished horses for the service even of the Czar. Under the reign of the Empress Anna Joannovna, the Duke de Biron, by the acquisition of first-class animals, selected from every European breed, powerfully contributed to the development of the hippic establishments of the crown; while the fashion of keeping splendid sets of carriage horses, which was maintained throughout the reigns of the Empress Catharine II., and the Emperor Paul I., induced individuals to form similar establishments, and gave rise, towards the end of the last century, to the studs of Counts Orloff, Razoumovsky, Goudovitch, and Koutouzoff. These, from the smallness of their number, could of course exercise but little influence on the rearing of horses in general. Still, by introducing into Russia the Mecklenberg, Danish and Dutch breeds, they contributed to the production of coach horses of a superior quality, distinguished by their frame and strength, and by the beauty of their shape, although the type has unfortunately since been lost.

At the beginning of the present century, the exigencies of war giving rise to an exclusive demand for cavalry horses—the abolition of the old massive vehicles, which were replaced by the more modern equipages then used in the rest of Europe—and especially the formidable competition of the crown establishments—all these circumstances combined had an unfavorable effect upon the studs of individuals, and caused their rapid decline, the maintenance of only a few of them being continued. About the time of the restoration of peace in Europe, in 1815, however, a hippic society was founded at Moscow, which undoubtedly gave rise to a new and vivifying impulse to the rearing of horses in Russia. It gained from the outset the patronage of the government and the attention of the public, by the institution of horse races, which prominently brought into notice the eminent qualities of the trotters. The brilliant success of the first experiment had for its immediate result an augmentation of the

number of private studs, of which the greater part were employed in the production of the horses that appeared at the Moscow races. The government on its part, did not fail to second the useful efforts of the society by putting at its disposal annual prizes, which it justly considered the best and most suitable stimulants for the improvement of the breeds. These races, in the opinion of breeders, have acquired the reputation of an infallible criterion to guide them in the selection of good animals.

Such are the most important historical data in regard to the rearing of the equine race in Russia; and when we consider the very favorable conditions for its development presented by the natural richness of the country, and the encouragement held out for it by the government, it must be obvious that its ulterior progress must depend entirely upon the judgment with which it is pursued.

The influence of these wise and beneficial measures will become more and more manifest in proportion as the public agents acquire more experience and aptitude, and the people learn to appreciate the advantages to be derived from them. The improvement of the breeds, among the agricultural population, is undoubtedly a great desidertum, and the establishment of rural depôts for breeding is a means to this end, of which the experience of other countries has already demonstrated the appropriateness.

The Imperial studs at present are seven in number, namely, two in the government of Worenèje, four in that of Kharkow, and one in that of Nijni-Nowgorod. Being destined to raise stallions for different services, they have been arranged accordingly, and each of them has a type peculiar to itself: The "Tschesmenka" stud is a nursery of pure-blooded horses, and is divided into two sections, one devoted to English races, and the other to Arabian, the "Khrénovoïé" stud is composed of three departments, saddle horses of the old Orloff breed uncrossed, saddle horses, and cross-breeds, including the "Rostoptschine" breed, and trotters; the "Derkhoul" stud, for large-framed cuirassier horses; the "Streletz" stud, for light cavalry; the "Novoalexandroff" stud, for carriage horses of large frame; the "Linareff" stud for draft horses of medium size; and the "Pochinki" stud for heavy draft-horses of large size, and the ordinary farm horses of the country.

The rural horse depôts, or private studs, are twenty-four in number and serve twenty-nine governments. In 1850, they comprised 1,440 stallions, which, in that year covered 25,189 mares, being an average of 17 or 18 for each stallion.

Among the agricultural horses of Russia, two classes are to be distinguished: The first, the "common" or indigenous breed, which possesses every proper quality, both as to strength and energy of temperament; but, although it leaves nothing to be wished for in either of these respects, it is unfortunately at the present day, subject to degeneracy, in consequence of precocious copulations between animals only two or three years of age; and the other, or "improved" breed, has shown, in numerous instances, the advantages of crossing it with trotters.

The greatest number of horses is to be found in the provinces of Orenburg and Perm, where most of the inhabitants, who are of the Tartar race, have a particular inclination for horse-breeding; in the country of the Don Cossacks, where horsemanship is an indispensable part of the daily avocations of the people; and in the provinces of Middle Russia, which require a great number of horses to carry on their extensive trade.

The following are the several varieties of Russian horses:—

"The "Mountain race, descended from Arabian stock.

The "Krimean," also from the Arabian, which keep a round pace across the steepest mountain paths.

The "Don" horse is light and quick.

The "Boshkir" and "Kirghis."

The "Kalmik" horse, very strong, patient, and accustomed to graze during winter. It is bony, large-headed and stubborn. All of the preceding are adapted or used for the saddle.

The "Viatka" horse, found in the province of the same name, though small, is best suited for the purposes of husbandry and post service, being capable of carrying heavy loads. In many places, it is mistaken for the "Obvan" race; but Obvan horses belong to the province of Perm.

The true Obvan horse is of good proportions, commonly fourteen hands high, or varying but half a hand above or below this mark, fine looking, quick in its motions and untiring, quiet and docile. Its color varies from sorrel to chestnut or russet, and sometimes, though rarely, to bay or black. On account of its strength, it is well adapted for agricultural labor and for carrying merchandise.

The "Bitioughine" horse of the district of Boeroff, in the province of Woronèje, originated from crossing the common horse of the country with a higher breed, chiefly that of Count Orloff Tchesmenski. Its chief characteristics are medium size, large but not fleshy head, with small, bright eyes, short neck, broad chest, round, slender back, strong and steep rump, large and stout leg-bones, flat hoofs, feet covered with thick hair, and long main and tail. These horses are very intelligent and quiet, regular in their draft, and able to endure much fatigue. They are less used for the saddle than as post horses. They can run from 30 to 50 miles without resting, upon a good steppe road. They easily draw a load of 1,800 pounds or more. They are rather long-lived, and subsist without shelter in winter, and on indifferent fare.

The "Kazan" horse, remarkable for its long mane, is a cross between the Viatka and Bashkir breeds.

There is also the "Metsensk" horse, from Metsen, in the province of Archangel, quite small in size, but strong. It is satisfied with very coarse food, even with moss, never tasting oats, which do not ripen in that region.

The divisions of Russia in Europe, with the number of horses, the rural and urban population, the population per square mile, the number of horses per square mile, and the number of horses to

each hundred inhabitants, in 1851, are indicated in the following table:—

Table of equine statistics of Russia.

PROVINCES AND GOVERNMENTS OF RUSSIA IN EUROPE.	Number of horses.	Rural and urban population.	Population per square mile.	Number of horses per square mile.	Number of horses per 100 inhabitants.
Archangel	37,000	252,000	21	3	15
Astrakhan	87,400	207,000	72	30	42
Bessarabia	89,950	902,000	1,049	105	10
Courland	110,200	530,000	1,069	222	21
Don Cossacks	372,640	798,000	271	126	47
Ekathérinoslaw	102,560	994,000	824	85	10
Esthonia	39,380	302,000	803	105	13
Finland	.....	1,554,000	.....	.....	...
Grodno	78,290	870,000	1,255	113	9
Jaroslaw	288,950	961,000	1,456	438	30
Kalouga	334,670	976,000	1,703	584	34
Kazan	389,610	1,390,000	1,223	345	28
Kharkow	191,750	1,184,000	1,202	195	16
Kherson	300,500	919,000	690	226	33
Kiew	120,000	1,701,000	1,861	131	7
Kostroma	309,790	1,047,000	700	207	30
Koursk	739,960	1,728,000	2,112	905	43
Kowno	211,350	935,000	1,234	279	23
Livonia	142,650	836,000	980	167	17
Minsk	117,620	980,000	604	73	12
Mohilew	395,280	835,000	944	447	47
Moscow	307,700	1,526,000	2,591	522	20
Nijni-Nowgorod	266,780	1,175,000	1,340	304	23
Nowgorod	208,720	890,000	402	94	23
Olonetz	49,510	278,500	100	18	18
Orel	551,820	1,408,000	1,639	642	39
Orenburg	1,913,800	2,130,000	314	283	90
Penza	331,330	1,066,000	1,545	480	31
St. Petersburg	93,800	1,145,000	1,180	97	8
Perm	697,990	1,879,000	309	115	37
Podolia	100,470	1,596,000	2,062	130	6
Poland	513,000	4,852,000	2,111	224	11
Poltawa	159,585	1,665,000	1,856	178	10
Pskow	114,790	673,000	832	142	17
Riazan	565,670	1,372,000	1,791	738	41
Saratow	871,230	1,861,000	528	247	47
Simbirsk	863,340	1,203,000	915	657	72
Smolensk	484,730	1,084,000	1,064	476	45
Stavropol	252,190	1,004,000	379	95	25
Tambow	643,060	1,685,000	1,402	535	38
Tauride	156,990	665,000	572	135	24
Toula	452,940	1,115,000	2,009	816	41
Tschernigow	356,630	1,392,000	1,392	357	26
Twer	499,530	1,411,000	1,154	408	35
Wiatka	494,910	1,929,000	772	198	26
Wilna	185,070	819,000	1,066	241	23
Witebsk	170,460	733,000	832	210	23
Wladimir	298,890	1,171,000	1,358	347	26
Wolhynia	282,630	1,495,000	1,154	218	19
Wologda	193,090	866,000	124	28	22
Woronèje	552,130	1,669,000	1,381	457	33
Total	17,092,335	61,658,500			

The reader will be struck in perusing the preceding table with the great variety of numerical relations between the extent of area, relative population, and number of horses. It will be perceived that the provinces situated almost entirely alike in regard to the density of their population differ essentially in the number of these animals. Thus, for instance, the relative population of Toula and Podolia are nearly the same; but the former contains 41 horses to 100 inhabitants, and the latter only 6. Again, in the government of Koursk the population is denser than in that of Poltawa, and yet the relative number of horses in the former is 43, and in the latter only 10 to 100 inhabitants. No explanation can be found for this seeming anomaly.

D. J. B.

CONDENSED CORRESPONDENCE.

Statement of JAMES WILLIAMS, *of Bolivar, Jackson county Alabama.*

Mules of the best quality can be raised in this county at a cost of $25 until three years old. They are then worth from $60 to $100 per head. Horses require a little more cost and care in raising. All breeds and bloods do well. Very little expense or attention has been paid to the importation of stock of any kind. In horses or mules, the more the crossing the better, if it be with imported blood.

Statement of GEORGE P. NORRIS, *of Newcastle, Newcastle county, Delaware.*

Few horses are raised in this county; but through the liberality of the Messrs. Reybold, several fine stallions of the "Morgan" breed have been introduced. A good farm horse will command $150.

Mules are used here in teams, but as yet, very little on the farm. We are beginning to appreciate them, however, and I have no doubt that in a few years they will come into general use.

Statement of WILLIAM W. WOODBRIDGE, *of Paw Paw Grove, Lee county, Illinois.*

The raising of horses is considered profitable in this vicinity. The cost of rearing a colt till three years old does not exceed $40. The average price six months old is $50. Good horses are worth from $300 to $400 a pair. We have a few "Black Hawk" and "Morgan" horses, from Virginia, which are in great demand.

Statement of C. W. BABBITT, *of Metamora, Woodford county, Illinois.*

The raising of horses in this section yields more profit to the farmer than that of any other animal. Their value is full a quarter or a

third more than it was a few years since. Much effort is made to secure breeds which are best for all purposes.

Colts five and a half months old, the usual time of weaning, are worth about $25; at a year and a half old, $45. A horse at five years old, well broken, and accustomed to the harness, will bring from $90 to $150.

Statement of ALEXANDER HERON, *near Connersville, Fayette county, Indiana.*

Much attention is paid to the raising of horses in this county; but as yet, they are not so profitable as cattle or swine, as their rearing is attended with more risk. Although we have many fine roadsters and saddle horses, yet they are chiefly designed for light harnesses or carriages.

The cost of rearing will average about as follows:—

Cost of foal, loss of service of mare, &c. . .	$30
Keeping during second year, ...	20
Keeping during third year, ...	25
Total cost, ...	$75

After the third year, a young horse will earn his keeping, and perhaps more, if properly trained; but a horse ought not to be brought into market until he is at least five years old, as the greatest improvement in him occurs between the ages of four and five.

At the age of one year a horse is valued at $40; at two years, $60; at three years, from $80 to $100; at four years, if well broken, from $100 to $150; and at five years old, a horse will sell from $100 to $200, according to size and quality, especially when in much demand for the Cincinnati market.

The cost of transportation of horses is rather less than that of cattle.

Statement of BENJAMIN F. ODELL, *of Plumb Spring, Delaware county, Iowa.*

The cost of raising colts in this section until three years old, is from $25 to $30. They subsist during the summer on wild grass, which is plentiful. In winter, in addition to what hay they can eat, they are allowed a small quantity of corn.

The prices of horses vary from $100 to $200 each.

Statement of C. F. MALLORY, *of Romeo, Macomb county, Michigan.*

Horses are now occupying more attention in this region than any other stock, as they net a much more profitable return for the amount

of care and expense bestowed upon them. The cost of rearing for the first three years averages about $10 a year, at which age they sell from $100 to $150 each. A ready sale is found in the home market.

The "Morgan," "Hamiltonian," "Black Hawk" and "Duroc" breeds are the favorites. A Hamiltonian Morgan, five years old, a very fine animal, is owned in this town, which, at three years old, took the first premium at the Horse Fair at Springfield, Massachusetts, in 1854.

Statement of C. S. G. CLIFTON, *of Leaksville, Greene county, Mississippi.*

The animals affording most profit to the stock-raiser, in this vicinity, are horses and mules, other animals being less profitable than cotton. They can be raised to three years old at an expense of $35, and will sell from $75 to $100 each. The cost of transportation, by railroad and steamboat, to Mobile, is $5 per head. We have but few, if any, imported blood animals.

Statement of J. W. JONES, *of Knob Noster, Johnson county, Missouri.*

Mules are raised in this section with great profit; at weaning time, they are worth on an average about $50 each; at one year old, $60; at two years old, $85; at three years old, about $110 each. The cost of rearing is about $10 a year, when they have good prairie grass through the warm season.

Horses are worth from $75 to $150 each.

Statement of WILLIAM B. GIDDINGS, *of Middle Grove, Monroe county, Missouri.*

The animals raised to the best advantage in our county are horses and mules. All of our largest mares are bred with jacks, because mules can be raised at a better profit than horses, which arises from the fact that they come to maturity much earlier, and will command remunerating prices at any age. We find them much the cheapest animal for our farms. They are also easier kept, as they subsist upon poorer food, and are less subject to disease. Their power of endurance is much greater, and they live much longer than the horse.

At weaning time, breeders generally sell their mule colts to men who buy up lots every fall for raising, at an average price of $40 or $50 each, although they sometimes will bring as high as $125. They are sometimes kept, however, until the fall or winter after they are two years old, when they are brought into good condition and sold for the Southern market, bringing in lots from $100 to $110 each. Stock mules, in lots, are worth, at one year old, about $60 each; at two years old, $80; and at three years old, $100 each.

Good saddle and draft horses are worth from $80 to $200 each.

Statement of H. G. STONE, *of West Boscawen, Merrimack county, New Hampshire.*

The rearing of colts in this section promises to be a profitable business. The variety most approved is the "Morgan," or crosses on the same.

Horses four years old and upwards are worth from $100 to $150 each.

Statement of EDWARD VAN METER, *of Salem, Salem county, New Jersey.*

Our stock of horses is good. We have a breed called the "Dove," of the Messenger strain. They are generally grey, and their size and speed have always entitled them to notice. There are also a number of imported thorough-bred horses among us; but our stock is chiefly derived from the get of half-bloods. For instance, we have had "Grand Sultan," "Grand Seignor," and "Bashaw," all imported Arabian horses. Our farmers have also bred from "American Eclipse," "Sir Henry," and "Sir Charles;" and "Winaflower," one of the best horses among us stood here, as well as "Mark Antony," "Rinaldo," and "Rattler," the latter three, splendid sons of the renowned "Sir Archy." An effort has been made, and with partial success, to introduce the "Morgan" stock, but our breeders believe that their progeny show too much their Canadian origin to give satisfaction.

Our horses have become so completely identified with the various grades and crosses of blood, that all that is wanting now is good treatment and attention to breeding.

The price of an ordinary roadster is about $125; of a "four-minute" horse, $150 to $175; and of a "three-minute" nag, from $300 to $500.

Statement of D. R. STILLMAN, *of Alfred Centre, Alleghany county, New York.*

We have no pure-bred horses in this section. Colts are usually weaned at four months old, and run to grass till winter, when they have access to shelter, with plenty of hay and a daily moderate supply of oat-meal or roots. The same keeping is sufficient till they are taken up for breaking, which is usually done in the winter before they are three years old. After this, they have better care.

The cost of raising a horse to four years old is about $60, at which age he will sell from $80 to $150. The cost of transportation to New York, by railroad, when more than one is taken, is $13 17 each.

Statement of GERSHOM WIBORN, *of Victor, Ontario county, New York.*

The horses in this section, like our horned cattle, are a mixed race. "Nimrods," "Durocs," and "Messengers" were formerly noted

breeds among us, but latterly, the "Sampsons," "Alfreds," and "Morgans," among our farmers take the lead. Sampson was a large, heavy, cow-heeled English draft-horse, imported about twenty years ago. Some of his crosses with other breeds, however, make excellent horses, gentle, strong, hardy and active. Alfred was a cross between the English draft-horse and a more active and lighter race. Some of his crosses with "Old Nimrod" make good, tough, high-spirited animals. But the Black Hawks and Morgans, at the present time, are the most esteemed for business or all work.

Nearly every farmer in this county raises his own horse; but I should judge that more are brought here, than are sold for transportation.

A good horse at five years old, will sell from $100 to $200.

Statement of JOHN P. HALLER, *of Lima, Allen county, Ohio.*

Some good horses are raised in this part of the State, and many are annually exported. They are worth from $70 to $150 each at four years old.

Statement of JAMES MCK. SNODGRASS, *of Mifflin, Alleghany county, Pennsylvania.*

Horses are advantageously raised here. Colts cost about $18 per head for their keep until they are three years old, when their average value is $80. Horses rate in the Pittsburgh market from $20 to $200 for good heavy draft, and for first-class, blooded animals, from $200 to $250. There are different breeds here, among which are the "Consul," "Hawk-eye," and "Glencoe;" also, for heavy draught, the "Irish Bay," "Black Sam," &c., mere local names, but all have produced some good stock. The "Morgan" horse is being introduced, and much more attention is paid to improvement within the last few years than formerly.

The cost of raising a mule, till two years of age, is about $20, when it is worth from $80 to $120. At this age, it is put to work. Many are used about the coal mines, where they answer a much better purpose than horses. Large-sized mules, at five years old, will command from $175 to $200 each.

Statement of D. MINIS, *of Beaver Plain, Beaver county, Pennsylvania.*

Horses are considered the most profitable stock raised in this section of our State. All grades are kept for use, from the full-blooded English horse, to the ponies of the Western plains.

The average price of good work horses is from $80 to $150.

Statement of RICHARD LECHNER, *of Stouchburg, Berks county, Pennsylvania.*

The raising of horses in this section is considered a profitable business. The cost of a colt at three years old is estimated at $60. The price at that age is from $80 to $100.

Statement of ALBERT HOOPES, *of Westchester, Chester county, Pennsylvania.*

Horses in this county are principally raised for our own use. We have blood animals, "Morgans," "Lions," "Canadians," and a very fine "Norman" diligence horse. The latter is a direct importation from France. When crossed upon our blood mares, I think it makes a valuable farm and draft-horse.

The value of a horse at four or five years old is from $100 to $250.

Statement of ROBERT W. BAYLOR, *of Wood End, near Charlestown, Jefferson county, Virginia.*

Horses can be profitably and advantageously raised with us. A colt can be kept in good order in winter on hay without grain, and can be pastured in summer for $1 50 a month from the time it is foaled until it is three years of age, at which time, if of good size and approved breed, it will command from $100 to $150.

The cost of sending a horse to Baltimore, by railroad, would be $8, or $3 on foot.

SHEEP AND WOOL.

SHEEP-FARMING IN RUSSIA.

According to the most distinguished agricultural authorities, Russia, from the great extent of her pastures, and from other local circumstances, is one of the most suitable countries in the world for sheep-farming, the encouragement and increase of which are extending more and more throughout the empire, especially in the spacious plains of Little Russia and the Crimea. Although this branch of industry had received the attention and encouragement of Peter the Great, and other distinguished personages for many years before, its commencement may date back to 1793, on the arrival of two Frenchmen, Ruvié and Vassal, who had taken refuge in Spain during the revolution, and there acquired a thorough knowledge of sheep-husbandry; but, as they encountered in that country many difficulties, and being aware that there were immense unoccupied plains in

Russia adapted to this purpose, they repaired to the Crimea, and made proposals to the government to introduce sheepfolds of Merinos, provided they should be allowed a certain quantity of land and a stipulated sum of money in advance. The proposition was agreed to, and Ruvié, having received from the government 100,000 rubles ($75,000) and 30,000 dessiatines of land, (81,000 acres,) engaged to establish in the Crimea a flock of Merinos, to be brought from Spain, and to multiply them to 100,000 head, as well as to teach one hundred pupils the art of rearing them. In 1803, Ruvié and Vassal, at the expense of the government, were sent to Spain; the following year, they returned, bringing one hundred Merino rams of the best quality. Vassal then went to Saxony, where he bought from the best flocks one thousand ewes and five hundred rams of the "Electoral" breed, which were taken to the Crimea, establishing in the district of Dnieprovsk a sheepfold, which is still believed to exist and to number at least 100,000 head, in their purity.

The government has from that period continued to offer every facility for the introduction of Spanish sheep into Southern Russia. By the Imperial order of January 12th, 1804, the unoccupied public lands in the southern provinces were granted for the purpose of establishing sheepfolds, with a promise that, if the grantees should keep them in good condition, they should be allowed as a reward the possession of those lands for life, or even in perpetuity. The following year, the government granted 130,000 dessiatines of land, (351,000 acres,) to another foreigner, by the name of Miller, provided he should, in three years, establish a fold of 30,000 head of sheep, one-third of which should be thorough-bred Merinos, and two-thirds of mixed breeds. Miller also pledged himself to keep thirty young men in his establishments as apprentices, each of whom should be permitted to bring at a certain season his own ewes to be coupled with Miller's Spanish or Merino rams, in order that the Russian breed might the sooner be improved. Conformably to these conditions, Miller established near Odessa two sheepfolds, which, however, from some cause or other, did not long continue. In 1809, a great number of sheepfolds of the best breeds was established in Saratoff and New Russia, which, from their success, formed the main wealth of those colonies. In 1810, M. Piktet, a Swiss gentleman, also established sheepfolds near Odessa, and was provided by the government with the same encouragement that had been extended to Ruvié and Miller. Such, among these and other proprietors as had improved their flocks, were rewarded by the government with presents. So many incitements, of course, could not prove fruitless, and the wool-trade was soon prosecuted on so large a scale that it became necessary to find an outlet for its sale both at home and abroad.

Sheep-farming in Russia is dependent, first, on the fabrication of woollen tissues in that country, and, secondly, on the demand in foreign markets. It prospers only so long as its extension goes hand in hand with increased demand for the raw material, either at home or abroad. The moment the production advances beyond this demand, the sheep-farming interest begins to languish. Since the commencement of the present century, and especially since the general

peace of Europe, in 1815, the increase of woollen manufactures in Great Britain, as well as on the Continent, has, with a rapidity unknown, given a strong impetus to the rearing of sheep, particularly of the fine-woolled sorts. Previously, Spain and a small part of Germany were almost the only countries of Europe which furnished wool suitable for the production of the finer fabrics, and even for those of medium quality, the production of the raw material being scarcely sufficient for the wants of the manufacturer, either in England or on the Continent. Consequently, the price of wool was maintained at a figure which insured a good profit to the sheep-farmer, at a time when many other agricultural products exhibited a tendency to fall. Such powerful encouragement drew the attention of agriculturists in several other countries to this branch of husbandry; and notwithstanding the enormous increase of flocks of sheep, the wool-trade remained in a very satisfactory condition until the period, still recent, when the fleeces of Australia first made their appearance in the markets of Great Britain, and subsequently in those of Germany and France. This competition became more and more threatening for the future prospects of the Continental sheep-farmer.

In order that we may form some idea of the extent of this business, it may be stated that the quantities of wool imported into England from the whole English Colonies from 1839 to 1841, inclusive, amounted only to about 11,500,000 pounds, forming 21 per cent. of the total importation of that article; while, during the period from 1846 to 1849, the mean importation from Australia, alone, amounted to 28,400,000 pounds, or more than 48 per cent. of the total quantity imported.

Thus Russia is one of those countries which have most keenly felt the competition of Australia. This branch of commerce began to acquire importance in Russia about 1830, the exportation of wool having previously amounted to only from 1,082,400 to 1,443,200 pounds. Since that time, it has increased, without reckoning the exportation of Poland, to 30,379,360 pounds. This was the culminating point which it attained in 1844. From that date, it continued to decrease until 1848, when it had fallen to 8,587,040 pounds. In 1849, it rallied, the exportation of that year being 21,684,080 pounds, two-fifths of which went to England; but the quantity retained for home consumption amounted only to 5,766,377 pounds. This sudden increase would have been a very satisfactory symptom, could it have been sustained; but it probably proceeded from temporary causes, as in commerce a single year can never form a basis for estimates of anticipated results. At any rate, the great and increasing preponderance of Australian wool in the English market is a fact concerning which there can be no doubt; and, what is perhaps of more importance, in a prospective point of view, is the appearance of wool from those distant regions in the Continental markets, especially in Germany.

But, notwithstanding this formidable rival, it is confidently believed that if Russia would bestow more care on the rearing of her stock, and the manipulation of her wool, she would have nothing to fear from the competition of Australia nor of any other country. If, however, the Russian sheep-farmers continue to direct their attention

as they have done hitherto, to increase the numbers of their flocks, rather than to improve their breeds, and if the wool-trade in the interior be allowed to continue upon its present unstable basis, it may be safely predicted that their foreign export of wool will still decline from year to year. It is a notorious fact that the washing and assorting of wool in Russia—operations of great importance—with a few laudable exceptions, are performed with such consummate slovenliness as to be elsewhere unparalleled. Indeed, such is the absurdity and desire for gain of some flock-masters that they speculate on the increment of weight from dirt, and wash their sheep in muddy water, in the expectation that the fleece will thus bring in more money; the fact being that the price offered by the merchant, who is quite alive to the trick, is in consequence so small, that the advantage redounds to him and not to the farmer. Again, in assorting the wool, no separation is made of the different parts of the fleece; sometimes, too, the wool of dead animals is thrown in along with that shorn from the living ones; and for ordinary wools, the product of different breeds, is indiscriminately mixed. This negligence is detrimental, not only to the sale of wool abroad, but also to the fabric of their home manufactured cloths, especially in regard to their receiving the dye. Their great want, next to equality and softness of texture, is the susceptibility of receiving a brilliant dye. The latter effect is most manifest in light and lively colors—the shades being unequal, and always presenting stripes or spots—which is owing to the circumstance that imperfectly assorted wools do not equally absorb the colors. In packing and transporting the wool, the negligence exhibited is as great as in any other department, and forms a striking contrast with the care bestowed upon these processes in other countries. The wool is often found to contain a mixture of heterogeneous trash, such as waste of hay and straw, fragments of bags, grain, husks, &c. It is also packed in coarse bags of bad quality, which are easily torn, and as the packing is bad, and the bales are exposed to the weather during the transport, nothing is easier than for moisture to penetrate them.

On observing such gross carelessness, we cannot but be forcibly impressed with the difference which it exhibits from the well-organised routine of sheep-husbandry in Germany and other countries, where there exists a healthy emulation. Every one takes care to have his wool cleanly washed, well assorted, free from mixture, thoroughly packed, and properly labelled. Each proprietor endeavors to acquire a good character for his flock, and to maintain it, which causes the wool of the best producers to be in demand and always sure of finding purchasers. Often the very name of the master inspires confidence, and secures a ready sale for his goods.

The rearing of fine-woolled sheep in Russia, which was carried on about thirty years ago only to a trifling extent, has since increased so rapidly that in 1846 the official returns exhibited the number of Merinos within the empire (including Poland) to be 8,300,000 head. In many of the flocks, however, the breed has degenerated, in consequence of the bad selection of males and injudicious crossing. These points require unremitting and constant attention; for it has been proved by experience that even the best breeds lose a portion of their

good qualities, and their reproductive powers, if the necessary crossings are not seasonably undertaken. There are celebrated flocks in Silesia and Moravia, where these precautions are observed with a degree of punctuality and order, which, to the casual observer, would appear uselessly minute. The separation of the flocks into sections, or families, is strictly observed; the product of each animal is carefully controlled, weighed, and registered, from generation to generation; and as soon as it is perceived that the fleece is diminishing in weight or deteriorating in quality, there is a change made of the ram or ewe, according as the degeneracy is manifested in the whole family, or only in the progeny of some ewes; and experience has shown that very frequently to a ram and a ewe the progeny of which had begun to degenerate, has been restored the procreative powers solely by the effect of these crossings among families of the same flock. It may here be observed that the sheep subjected to this careful régime consist not of a small number, but of flocks of from 10,000 to 20,000 head.

The support of sheep-farms organised with such thorough regularity as this requires no doubt a large amount of care and capital; but for these the results obtained afford a handsome return. Of course, such a perfect system is inapplicable to the countless flocks that graze upon the Russian steppes; but, between a system so refined on the one hand, and the negligence which pervades the greater part of the empire on the other, there is surely a broad margin for gradual improvement.

Deterioration of breeds has been manifested in Russia for some time past, not only in the Merinos, but also amongst the indigenous sheep, which furnish wool for the more common cloths. There are in that country several sorts of these common breeds, some of which yield such coarse wool that it can only be used for the manufacture of the most inferior felts, or in the caulking of ships; but there are also others, of which the wool is employed for several sorts of ordinary cloths, and might be improved, at least up to a certain point, by judicious crossing and more careful management, but which, nevertheless, goes on deteriorating. Instead of being regenerated by coupling with rams of a better breed, they are allowed to mix with races more inferior still; and their scanty nurture in winter, in connexion with the inclemency of the season, likewise has a tendency to render their wool coarser. It has been observed that the wool of the common sheep of the steppes, which are unsheltered from the rigors of the northern winter, become sensibly improved when they are removed into the central or western provinces of the empire, where they can be protected only during a part of the year.

Thus, considering that the fine-woolled sheep require a temperate climate, together with more care and better food, than the common breed, it is evident that there are but few parts of Russia in which these conditions are found combined; and that the southern provinces especially are scarcely less propitious to the rearing of fine animals, which are there very apt to degenerate and yield but little wool. This degeneration may be attributed to bad food during winter; to the quality of the pastures in the steppes, where the base is saline; to the want of good water; to the frequent droughts; to the heavy dews,

untimely frosts, and other circumstances peculiar to these regions, although some of them are merely local; for in these vast plains, there are many districts abounding in good pasturage and furnishing a sufficiency of winter food. Neither can we consider all the southern provinces of the empire as unsuitable for the rearing of fine-woolled sheep. The degeneracy of these breeds in the south of Russia, which is an ascertained fact, it is believed proceeds in a great measure from the rapid and often inconsiderate extension of this branch of rural economy within the last twenty-five years. Encouraged by good markets, many of the proprietors in these districts have augmented their stock of Merinos beyond bounds, without calculating their means of supporting them during winter; while others, having an eye to quantity rather than to quality, have not paid sufficient attention to keeping the breed up to the standard—a matter demanding the most continuous care and attention; for the Merino, not being of pure blood, readily degenerates, unless this tendency be augmented in time by fresh crossings.

In conclusion, it may be added that, in mild and temperate climates, the successful rearing of sheep depends entirely upon the extent and quality of the pasture. Thus, for instance, in Dalmatia, one of the poorest provinces in regard to the productiveness of the soil, the arable land of which does not occupy more than 11 per cent. of the whole erea, and which is almost entirely destitute of meadow land; possesses a comparatively larger number of sheep than any other province of the monarchy. But, in countries in which the winters are long and severe, it is impossible to maintain very large flocks in the open air, without exposing them—especially the finer breeds—to great and frequent losses, unless they are housed, or otherwise secured, and well supplied with fodder for the whole period that they are unable to remain at pasture. These are facts which many sheep-farmers seem constantly to forget.

The following table exhibits the number of fine-woolled sheep, and the total number of sheep, in each province of Russia, and the number of both to each hundred inhabitants:— D. J. B.

Table of Sheep statistics of Russia.

Governments.	Number of fine-woolled sheep.	Whole number of sheep.	Number of sheep to each 100 inhabitants.
Archangel	.....	100,000	40
Astrakhan	3,420	810,450	392
Bessarabia	717,320	1,439,380	160
Courland	7,500	167,700	31
Don Cossacks	.....	2,431,570	305
Ekathérinoslaw	1,389,110	2,059,730	207
Esthonia	55,880	142,770	47
Grodno	260,000	507,230	58

Governments.	Number of fine-woolled sheep.	Whole number of sheep.	Number of sheep to each 100 inhabitants.
Jaroslaw	.....	445,450	46
Kalouga	280	445,570	46
Kazan	4,950	770,330	55
Kharkow	614,150	1,462,770	124
Kherson	627,390	1,624,250	177
Kiew	273,560	820,740	48
Kostroma	2,190	569,620	54
Koursk	74,220	777,300	45
Kowno	8,830	390,490	42
Livonia	54,545	256,930	31
Minsk	96,425	302,040	31
Mohilew	30,200	457,630	55
Moscow	1,000	339,300	22
Nijni—Nowgorod	10,020	500,550	43
Nowgorod	.....	207,390	23
Olonetz	.....	75,610	27
Orel	16,430	937,300	67
Orenburg	20,590	2,372,790	111
Penza	42,490	612,490	57
Perm	1,650	828,940	44
St. Petersburg	.....	57,400	5
Podolia	300,320	682,980	43
Poland	587,700	3,192,000	66
Poltawa	657,360	1,684,180	101
Pskow	1,500	92,080	14
Riazan	8,690	758,300	55
Saratow	358,990	2,911,750	156
Simbirsk	71,080	2,111,420	176
Smolensk	1,875	561,190	52
Stavropol	24,220	1,182,480	118
Tambow	80,570	926,750	55
Tauride	978,360	2,440,420	367
Toula	17,640	506,670	45
Tschernigow	90,955	633,330	45
Twer	260	447,850	32
Wiatka	540	923,730	48
Wilna	26,970	251,940	31
Witebsk	1,090	87,830	12
Wladimir	.....	398,950	34
Wolhynia	461,580	996,920	67
Wologda	.....	434,350	50
Woronèje	342,260	1,707,320	102
Total	8,334,149	44,846,160	

CONDENSED CORRESPONDENCE.

Statement of D. L. R. BUTT, *of Centre, Cherokee county, Alabama.*

The cost of producing wool in this section is about 12½ cents a pound, and the market value 25 cents. There is no article that can be produced in this region with so little care and cost, according to the market price, as wool, and I am surprised that there is not more attention paid to its production.

Statement of T. L. HART, *of West Cornwall, Litchfield county, Connecticut.*

Some ten years since, after having given up the idea of raising wool with a view to profit, I bought a few Cotswold sheep, from which, with occasional purchases from the best flocks, I could find in the State of New York, I have raised my present stock. This year, I have exhibited at our State Fair a sheep with her three lambs, all of one birth, weighing 100 pounds each at six months old. I raise twenty-five lambs to every twenty ewes. This year, I sold the progeny of a single sheep, eighteen months old, for $50, and have her fleece left. The fleeces of my other sheep this year weighed from 7 to 12½ pounds each. I also received $40 in premiums at our late State Fair. The income of my entire flock of forty, commencing with the beginning of last winter, amounted to more than $600. In June last, I sold a lamb thirteen months old, which weighed 157 pounds. With good care and management the great weight of these sheep prevents them from being unruly or much inclined to ramble; besides, they are not so liable to be killed by dogs as smaller sheep.

With a view of testing the comparative value of the breeds, I have lately purchased a few of the New Oxfordshire sheep, which I intend to keep in all respects like the Cotswolds. It has been my practice in some cases, to take from their dams a pair of twins and bring them, up as cossets, teaching them to run with the cattle.

The estimated cost of keeping a sheep until eighteen months old is $5.

Statement of WILLIAM W. WOODBRIDGE, *of Paw Paw Grove, Lee county, Illinois.*

This part of the State is well adapted to sheep-raising. There are some good flocks of the fine-woolled varieties. As the country is comparatively new, the prairie wolf commits some depredations on our flocks.

The price of wool is from 30 to 40 cents per pound. There are a few of the Leicester sheep in this section, and they are highly esteemed for mutton.

Statement of ALEXANDER HERON, *near Connersville, Fayette county, Indiana.*

Sheep, in this vicinity, could be raised at considerable profit, were it not that they are so frequently killed by dogs, which discourages those who would otherwise turn more attention to wool-growing. They can be brought to maturity with far less labor and attention than any other kind of stock, as they are much closer feeders and do not require grain. In my experience, a flock of one hundred Merinos crossed with the Leicesters were kept during last winter on 4½ tons of blue-grass and Timothy hay, worth $10 a ton. This flock, when shorn, averaged 5 pounds of wool per head, which readily sold here unpicked at 30 cents a pound, giving $1 50 to each sheep for the wool. A portion of the same flock was sold to the butcher, after shearing, at $2 50 each, making the yearling sheep worth $4, leaving about $3 a head in profit, the cost of rearing being about $1. This, perhaps, is more than the average profit, which might be about $2 a head.

Statement of BENJAMIN F. ODELL, *of Plum Spring, Delaware county, Iowa.*

Sheep-raising in this section, as yet, has not been very extensive on account of the depredations committed by wolves, but as the latter are now becoming scarce, our farmers begin to turn their attention to this branch of industry.

A sheep, after shearing, is worth $2; the price of wool is from 45 to 50 cents a pound.

Statement of D. R. STILLMAN, *of Alfred Centre, Alleghany county, New York.*

There are a considerable number of sheep raised in this section, principally Merinos and their grades. There are quite a number of pure-bred Spanish and French Merinos, the latter of which are the general favorites. Since their introduction here, in 1849, they have increased the weight of fleece on an average to nearly or quite 2 pounds in the flocks where used. There is also a growing interest in mutton sheep, for the improvement of which the South Downs are being introduced. Sheep are kept in pasture from seven to eight months, and the remainder of the year on hay and straw, the younger portion of the flock usually receiving daily a small quantity of grain.

The cost of keeping a sheep will vary but little from $1 a year, and at two years old, it will sell for $2 from pasture, leaving the wool for the profit. The transportation to New York city, by railroad, is $1 each, from which there is a considerable deduction when a large number is sent.

Good wool can be produced at a less expense of keeping and labor than poor, as the fleeces are heavier, while the sheep are more quiet, and consequentlv require less food. The cost of raising from three-

fourths to full-blooded Merino wool is about 25 cents, which sells for 25 to 50 cents a pound. It costs 60 cents per 100 pounds to transport it, by railroad, to New York.

Statement of JOHN YOUNG, JR., *of Forest Grove, Alleghany county, Pennsylvania.*

Sheep are profitable stock with us. We have some full-blooded South Downs and Leicesters. From what I have seen of their crosses upon the common stock, I think a very great improvement will be the result. They prosper in every part of the county. Last year, their wool was worth 33 cents per pound. The cost of raising them is 75 cents per head, and when full grown they are worth $2 each. The greater part of the stock, however, is of Spanish Merino blood, and brings high prices.

A good Leicester buck, at one year old, brings $10, and ewes, for breeding, $5 each.

Statement of C. SNIVELY, *of Penn Township, Alleghany county, Pennsylvania.*

Of sheep we have several varieties. The South Downs and Leicesters are considered best for the butcher, particularly the former; but the latter have heavier fleeces. Those uniting good qualities for mutton and weight of fleece are most profitable in the vicinity of the Pittsburgh market. The South Down is a hardy animal, and takes on fat perhaps faster than other varieties. Good mutton is always in demand at Pittsburgh.

The price of wool is varying. Last year's prices ruled from 25 to 40 cents per pound for common prime. For several years previous, prices were higher.

Statement of JAMES MCK. SNODGRASS, *of Mifflin, Alleghany county, Pennsylvania.*

The rearing of sheep has not been much attended to in this county, although almost every farmer has a small flock. The devouring dogs have been so destructive to them that many farmers have abandoned the business. The Leicester, South Down, Spanish Merino and common stock are raised to some extent. Many believe the Leicester to be the most profitable, on account of the size of its carcass, and the quantity of its fleece.

Good mutton commands a high price in our market, ranging from $3 50 to $6 per head. Wool brings from 30 to 40 cents per pound.

Statement of D. MINIS, *of Beaver Plain, Beaver county, Pennsylvania.*

In some parts of this county, sheep are considered more profitable than any other kind of stock; but, within the last few years, the

fluctuation in their value, has operated injuriously to this branch of husbandry. We have French and Spanish Merinos, and grades down to quarter bloods. A large proportion of our sheep, however, are a cross with the Spanish and Saxons, few, if any, of the common kind being kept.

The average price of wool with us may be estimated at 33 cents a pound. Sheep and lambs sell from $1 to $5 each.

Statement of J. S. GORE, *of Tippecanoe, Fayette county, Pennsylvania.*

Sheep of all kinds have been introduced into Western Pennsylvania, which has long been celebrated for producing good mutton and fine wool; yet it did not acquire to the reputation it now enjoys until within the last few years, during which time some of the finest imported French and Spanish grades have found their way into this county, and it is now clearly shown that our sheep can compare with any in the world. From time to time, various coarse-woolled animals have been brought among us, but they have never rendered satisfaction to those who introduced them. A few years ago, many Saxony sheep were brought here, but their introduction eventually ruined some of the finest flocks in this and in Washington county.

It costs about $1 50 a head to keep sheep properly for a year, while wool is worth about 40 cents a pound; so that it is evident that sheep-clipping, at 2½ pounds a head, leaves no profit. But our improved breeds, which yield from 4 to 12 pounds per head, pay very well. Besides this, I find that my French sheep raise about three lambs per head annually.

Statement of ROBERT W. BAYLOR, *of Wood End, near Charlestown, Jefferson county, Virginia.*

Sheep are very profitably raised in this section, especially the improved breeds, commanding at home from $8 to $10 each at two years old.

We have as good imported Cotswolds and South Downs as England can produce, the latter being preferred. Their crosses upon our common stock are regarded as highly advantageous.

Wool-growing amply remunerates the shepherd for his care. Wool cannot be raised under 20 cents a pound.

Statement of JAMES E. KENDALL, *of Poplar Grove, Kanawha county, Virginia.*

This is decidedly a fine sheep-raising county, but the subject has not received the attention it merits. The cost of producing wool, I believe, does not average more than 12½ cents per pound. Our sheep are seldom fed. They keep in fine condition the whole year on the mountain range. They are free from disease, and live to a good age. Wool is worth from 30 to 37½ cents per pound.

GOATS.

INTRODUCTION OF THE CASHMERE-SHAWL GOAT.

The introduction of wool-bearing goats has deservedly attracted some degree of attention in the United States within the past few years, a well-directed and apparently successful attempt having been made, in 1849, by Dr. James B. Davis, of Columbia, in South Carolina. Having resided several years in the dominions of the Sultan, in 1838, he procured in Turkey, in Asia, seven females and two male goats, alleged to be of the pure Cashmere breed.

In 1853, when Dr. Davis communicated to the Patent Office some account of these animals, he stated that the number of pure breeds of his flock was then but thirty, the progeny having been chiefly males; but that the half and quarter-breeds obtained by crosses with the common goat, were much more numerous. He also stated that the full-blooded young were equal in all respects to the imported, with even a finer and heavier fleece, while the mixed breeds proved a great improvement upon the common stock. He moreover stated that he had a female Thibet-shawl goat, from which there had been considerable increase by breeding with a Cashmere buck. The demand for the bucks of his flock, at $100 each, was said to be very great, and even the mixed breeds were freely purchased by persons who were anxious to improve the varieties already in the country. Information has also been received from other sources, that some of the full-blooded males of this stock were taken to the banks of the Hudson, in New York, as well as to other places, and have prospered well.

In 1854, Mr. Richard Peters, of Atlanta, in Georgia, purchased from Dr. Davis his entire stock of full-blooded female goats, and some of the males; and he has since been understood to decline parting with any of them in the hope that other persons may be encouraged to make direct importations.

In the communication of Dr. Davis referred to above, it is remarked that "the Cashmere, Persian, Angora and Circassian goats are one and the same animal, changed in some respects by altitude, though but little by latitude." Mr. Peters, however, says of those in his possession, in a recent communication, that "they differ materially from the Thibet shawl-goats, and also from the Angora goats, although they may prove to be of that variety, changed by climate, breeding, and selections. "They are in my opinion," he adds, "the true Cashmere goats, a variety never before introduced into Europe nor America." He proceeds, "A Mons. Tourneau, in 1818, introduced a large flock of the Thibet goats into France, descendants of which are now bred in England. I have seen specimens of the latter; they are of but little value, and entirely different from the Davis goats." *** "The goats of the province of Angora are of mixed colors, and have a coarse fleece, with their horns turned down, and differ from the Davis goats as much as our common sheep differ from the Merinos."

There appears to be some misapprehensions manifested in these quotations, which it may be proper to correct: The Cashmere and the

Thibet goat are the same. The regions called Cashmere and Thibet adjoin each other, and the western portion of the latter, which is called Little Thibet, is included in the dominions of the Maharajah of Cashmere. This goat is found also in the country of the Kirghiz, in Central Asia, at the bend of the Ural, north of the Caspian sea. It is of the size of the domestic varieties most common in Europe and the United States, and is covered with long, flat, and falling silky hair, beneath which there is in winter the delicate greyish wool which constitutes the fabric of the costly Cashmere shawls of commerce. Only 3 ounces of this wool are, on the average, obtained from each goat. This is sold by the goatherds for a little over $1 a pound. Thirty ounces, valued at $2, is all that is required in the manufacture of a shawl a yard and a half square. The immense cost of these shawls in the European market is therefore a subject of much wonder to those unacquainted with the history of their manufacture and transportation. The wool is first combed from the goats in the mountains of Thibet and sent to Cashmere, where a heavy duty is paid upon it. It is there bleached, spun into yarn, and taken to the bazaar, where another tax is paid upon it. The thread is then dyed, the shawl woven, and the border attached to it, when the weaver has to carry it to the custom-house, where it is taxed according to the discretion or caprice of the collector. The two dollars' worth of wool have by this time become magnified in value; but if they are intended for the European market, they have yet to pass through the ordeal of still heavier exactions. They must be borne from Cashmere across the Indus to Peshawur on the frontier of Afghanistan, a journey of twenty days, upon the back of a man, the road being often impassable by camels or mules, deep precipices being crossed upon suspension bridges of rope, and perpendicular rocks climbed by means of wooden ladders. At various stages of this journey, taxes are exacted, amounting to $9 or $10 in the aggregate. From Peshawur to near the confines of Europe, tribute is paid at many custom-houses; but the forbearance of the marauders of Afghanistan and Persia, and of the Turkomanic hordes, must also be purchased at a high price. The precious burden is then conveyed to Europe over the Caucasus, and through Russia, or, as is now frequent, through the Turkish provinces to Constantinople.

There is some evidence of the importation both of the Thibet and the Angora goats into France at different times. Mr. Peters, as has been already quoted, ascribes to a Mr. Tourneau, in 1818, the importation into France of the Thibet goat, which he believes he has lately seen in England in a degenerate condition. It is probable, however, that, as a casual observer, Mr. Peters did not take time to investigate the proofs of the idenity of the goats he saw, with the importations from Thibet into France. It is well known that, in 1819, a Mons. Jaubert brought some 400 or 500 Thibet goats from the Kirghiz territory to France, having started from the former country with 1,300. Those which survived the journey were received at Marseilles by a Mons. Tessier, and by him placed in various situations in France. A doubt was at one time expressed as to the purity of the breed of these goats, but no good reason was advanced

as the basis of such a doubt. Their fleece did not prove abundant enough for profit, however, until in 1823, when a Mons. Polonceau caused a cross to be made between the Thibet, or Cashmere, and Angora goat, (whence the latter was procured was not stated,) with great success, insomuch that, instead of three, thirty ounces of down was obtained from each of several of the cross-breeds; and, it is added, of a superior quality, being of finer and longer staple, while the animals themselves were quite hardy and more docile.

In 1824, some of the Thibet goats were conveyed from France to the county of Essex, in England, by a Mr. Towers; but the number was not regarded as sufficient, nor is there any record of the result.

Dr. Davis is therefore obviously misled in supposing that the four varieties of goats named by him are identical; and Mr. Peters is equally in error in the distinction he defines between Cashmere and Thibet-shawl goats, and in alleging that the goats of Angora are of mixed colors, coarser fleece, &c., for they are always described as "invariably of a silvery white, with long and silky hair of one sort only." The specimens received at this Office, of the fleece of Mr. Peters' goats, correspond with this description of the hair of the Angora goat, and no specimen has been received of the greyish undergrowth of down peculiar to the Cashmere or Thibet; but we have the authority of an officer of the British army, who passed several years in India, for the statement that, from goats taken from the mountains of Thibet to the warm climate of British India, this down wholly disappeared the first year. The portraits of a pair of Mr. Peters' goats, (shown on Pl. IV. and Pl. V.,) correspond to the descriptions usually given of those of the Thibet breed.

From all the information at present obtainable upon this general subject, it may be concluded that the goats in the possession of Mr. Peters are probably of the true Thibet or Cashmere variety; that it is to the intelligence, energy, and patriotic enterprise of Dr. Davis and Mr. Peters the country is indebted for the best directed, most persistent, and most successful effort that has ever been made to introduce an improved breed of goats either into Europe or America; and that the example of these gentlemen should be emulated by every intelligent and public spirited agriculturist in the country, who has the means of either uniting in the work of making further importations, or of causing the general propagation and cherishing of those introduced by others. The importance of this enterprise is greater than is usually supposed; for, depreciate as we may in theory the desire of fine and luxurious apparel, this desire is universal, and will be gratified at whatever cost. The home demand for woollen fabrics of the finest textures will continue to be large, urgent, and permanent, and the home supply should correspond to it. The flesh, also, of the goat and of the kid, has always been relished and regarded as wholesome and nutritious in those countries in which it is abundant. From the most remote antiquity, the milk of the goat has been in requisition in various parts of the world. In Syria, at the present day, the milk of the goat and sheep, almost, if not entirely, supersedes that of the cow, and its products of butter and cheese are in general use. In Switzerland, and in mountainous and other portions of France, Spain, Italy,

&c., the same usages prevail. The variety and coarseness of the fare of the goat, the hardiness of its nature, and the facility with which it accommodates itself to either a sheltered or exposed life, enable persons in all situations to keep it without inconvenience, with the single exception that it is destructive to young trees, which it denudes of their bark when they are accessible to it; but it generally selects bitter and slightly astringent herbs for its food.

Many reasons have been assigned for the fact that the presence of a goat in a stable is beneficial to the health of the horse, such as that the odor exhaled from its body is salutary, that its companionship is cheering to him in his solitude, that the portions it selects from his food would be injurious to him, &c. Whether the primary fact assumed is true, and if so, whether each or all of these causes are real, will not here be discussed; but the usage of encouraging this companionship has been so well approved by experience, that its practice, which is seldom attended either with expense or inconvenience, should not be inconsiderately forsaken. These remarks apply alike to the common varieties, and to the improved breeds of goats herein commended to favor and adoption. D. J. B.

MICROSCOPIC EXAMINATION OF THE HAIR OF ASIATIC GOATS.

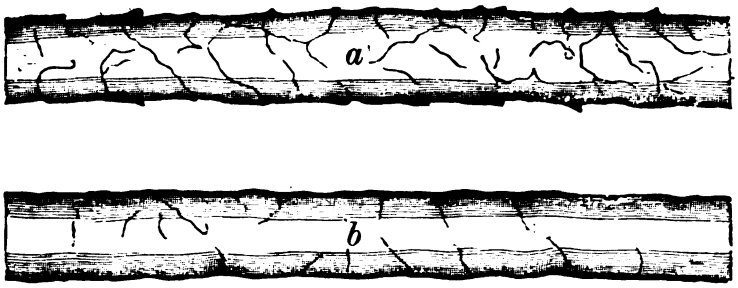
BY GEORGE C. SCHAEFFER, M. D., U. S. PATENT OFFICE.

As the history of these goats has already been given in the Agricultural Report of the Patent Office for 1853, as well as in other publications, by Dr. James B. Davis, of South Carolina, it is deemed unnecessary to repeat it here. The full-bred animals of this importation, as well as their crosses on the common goat, have been sent to various parts of the country. Dr. D. C. Ambler, who has introduced them into New York, presented the specimens for examination to this Office. The value and good points of these animals have been so well reported upon, at the various exhibitions at which they have taken prizes, that I shall say nothing upon these subjects, but proceed at once to the immediate object of this paper.

The first specimen examined is from a full-bred "Davis" female, born in South Carolina, and carried, when four months old, to Waterville, Oneida county, New York, by Dr. Ambler, by whom it is owned. The fleece was taken when twelve months old. The lock examined shows a very beautiful curled or wavy hair, of silvery whiteness, with a fine, downy wool at its base. The hair selected for representation was 10 inches long. A portion, taken about the middle of its length, is

shown in cut *a*, magnified about four hundred times. In copying the original drawing, the projecting points of the external scales, or cells, of the hair have been somewhat exaggerated.

The next specimen is also from a full-bred female, born in South Carolina, and carried to Harper's Ferry, in Virginia, when four months of age. The fleece was taken when twelve months old. In this lock, the wool is somewhat more abundant than in the former: the hair being nearly as long and a little finer. In all the hairs, taken from this sample, the external scales, or cells, were rather less evident than in specimen *a*. In cut *b*, is shown a hair in which they are least plainly marked.



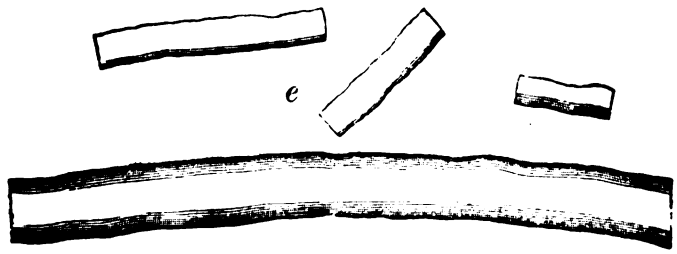
a.—Hair of a full-blooded Asiatic goat, from New York, magnified 400 times.
b.—Hair of a full-blooded Asiatic goat, from Virginia, magnified 400 times.

The third specimen is from a full-bred male, also born in South Carolina, but carried to Charlestown, Chatauque county, New York, owned by Mr. D. Davenport. The fleece was taken when twelve months old. There is rather less wool, but the character of the hair is similar to that of *a* and *b*, a portion of which is denoted on cut *c*.

c.—Hair of a full-blooded Asiatic goat, from New York, magnified 400 times.
d.—Hair of a second cross between the Asiatic and common goat, magnified 400 times.

The hair shown in the drawing, by *d*, is from the second cross between the full-bred and common goat, born in South Carolina, and

carried to New York, when four months old. The fleece is said to have been taken when about twelve months of age. This is much shorter than any of the others, being about 5 inches long; but it is exceedingly beautiful, both in texture and in color. The hair shown in cut *d*, is less in diameter than any of the others. The degree of fineness is about that of the finest Saxony wool.



e.—Outlines of hairs of a full-blooded Asiatic goat, taken from the finest Calcutta shawl, magnified 400 times.

By way of comparison, a mere outline is given at *e*, of different hairs, from a piece of shawl stuff, imported from Calcutta, and said to be the finest ever brought to this country. The fabric was dyed red, and has contracted somewhat in the process. It is evident, from the character of the smaller hairs, that they have been taken at a much earlier age than those represented above.

It is gratifying, then, to be assured that the fleece may be raised in this country with a fineness closely approximating to that which it has ever attained in Asia, under the most favorable circumstances.

The cross with the common goat is particularly interesting, as showing no deterioration in the hair. It has not been considered necessary to dwell upon the minute peculiarities of structure in thsee specimens. Larger quantities of the hair and more exact information as to the treatment, age, and condition of the animals, would be required to give any real value to such an investigation.

SWINE.

THE SWINE OF RUSSIA.

The rearing of swine is carried on in Russia to a considerable extent, especially in the governments of Mohilew, Kowno, Tschernigow, Kharkow, Saratow, Tambow, Woronèje, Orel, and Koursk. In the latter, there were reckoned, in 1846, nearly 600,000 head, and in each of the other governments, from 400,000 to 500,000. The aggregate in the forty-eight governments was estimated at 10,053,500 head. In the kingdom of Poland, it was estimated that there were 800,000. Adding Finland and those governments in which the statistics were not officially ascertained, the total estimate was 12,000,000, or about one animal to every five inhabitants, the relative number to the population being nearly the same as in Austria, and much larger than in Prussia or in France; but it is still far less than it might be, considering the means the Russians have of feeding them. In general, they bestow but little care on this branch of rural economy, although it is well suited to the country, and is generally very profitable. It is much neglected in the provinces of New Russia, where it is believed that ten times the number of animals might be raised that now are. In the governments of Kherson, Ekathérinoslaw, Tauride, and Bessarabia the number has scarcely increased for the last forty or fifty years, notwithstanding the encouraging example of the German colonists who derive great profits from this source. As a proof of the negligence with which the swine are treated in some districts, the following observation by M. Haxthausen, on the government of Nijni-Nowgorod, may be cited:—

"We have seen herds of long-bristled swine wandering about in the forest during summer, like deer, without the least superintendence. In autumn, the people catch as many as they can, and make an equal distribution of them amongst all the families of the village, so that, in regard to these animals, there is no distinction of individual property."

When we consider what large numbers of swine have for some years past been sent from Hungary and Servia by railway to Hamburg, and thence to England, notwithstanding the enormous expenses of such long inland journeys, we may conceive the importance which this business might attain in a very short time in those provinces of Russia that are not remote from the coast.

The total value of swine in Russia and Poland is estimated at $15,750,000. This includes the value of the bristles, most of which are exported from Little Russia, and form no inconsiderable article of commerce. D. J. B.

CONDENSED CORRESPONDENCE.

Statement of D. L. R. BUTT, *of Centre, Cherokee county, Alabama.*

Pork cannot be raised here under 5 cents a pound. It usually sells for 6 or 7 cents. There is very little more raised than is required for home consumption. The cost of transportation to Charleston is $1 75 per 100 pounds.

Statement of ALEXANDER HERON, *near Connersville, Fayette county, Indiana.*

Among the different animals raised in this section for market, swine take the lead, as they are far the most profitable. There is some objection to them on account of their rooting propensities and the consequent destruction to pastures; but this has been demonstrated to be easily avoided by "ringing" the nose, thus rendering them almost as harmless as sheep.

The best breed of swine which we rear is the "Chester White," which constitutes the largest proportion of the hogs in this region. Stock hogs will thrive and winter well on seven bushels of corn; and if there be plenty of "mast" they will do well on less. The cost of rearing a hog for market may be estimated as follows:—

For seven bushels of corn at 30 cents, . . .	$2 10
For three months' pasturage, on clover, from 1st September to December 1st, ...	50
For eighteen bushels of corn for fattening, at 30 cents,	5 40
Total cost, ...	$8 00

Hogs fed in this way will average 250 pounds in weight, which, at 6 cents a pound, will make the gross sale per head $15, showing a net profit of $7 on each head. This is equivalent to selling the corn at 60 cents a bushel, besides the improvement of the ground on which they were fed, by their manure.

Most of the hogs reared here are packed at Connersville, our home market in this county. The difference in price between this and the Cincinnati market is about 35 cents per 100 pounds, which is nearly the cost of transportation. The number of hogs which have been packed here this season is 25,000.

Statement of L. E. DUPUY, *of Shelbyville, Shelby county, Kentucky.*

Our hogs have been crossed upon the "Berkshire," "Irish Grazier," "Woburn," &c., until we scarcely know what we have, except that they are hogs. Our rule is to get the longest hog that will fatten early and kindly, without regard to name. We make them weigh from

200 to 350 pounds when a year or eighteen months old, by feeding on clover, rye, oats, and corn.

Statement of E. A. HOLMAN, *of Harvard, Worcester county, Massachusetts.*

The animals raised to the best advantage with us are the "Suffolk" swine, which are also successfully crossed on our common breed. The best mode of keeping is in sheltered pens, fed from the refuse of the dairy with the addition of meal of Indian corn, or some other grain. The cost of raising at six weeks old is 8 cents a pound. The market value at that age is $3 50 each.

The cost of producing pork is 9 cents a pound; market value 10 cents a pound; transportation to Boston, $3 a ton.

Statement of GERSHOM WIBORN, *of Victor, Ontario county, New York.*

A considerable number of hogs is raised in this county, though it is not thought to be profitable to keep any more than can be produced on the farm without feeding too much with good marketable grain. It is generally believed that they should be raised until they are fifteen or eighteen months old, principally upon grass and milk, and then shut up in pens and fattened with barley or corn.

Our hogs, like other farm stock, are of a mixed character, produced by crossing the best breeds of Europe with the old races of this section. The latter were long-legged, long-visaged, flap-eared, and coarse-boned. Their most *unamiable* characteristic was a great affection for chickens, goslins, and lambs. The "Berkshire" was for a long time a very popular breed, fine-boned, and easily fattened, but rather too small. The "Leicester" is a good-sized fine-boned hog, and, if bred well, will fatten at fifteen months old, and will weigh 500 or more pounds. The "Suffolk" breed has also of late been introduced here, but from the thinness of their hair they do not appear to be at all adapted to the severity of our winter climate.

Statement of JAMES MCK. SNODGRASS, *of Mifflin, Alleghany county, Pennsylvania.*

Almost every farmer here raises his own pork, and a surplus for home trade. To raise it on corn would cost from $4 to $4 50 per 100 pounds. We have the "Berkshire," the "Chinese," the "Bedford," the "Chester county," and the common or wood breeds. The Chinese and Berkshire have been profitably raised several years. The Chester county hog has been introduced, and is much valued by our farmers.

Statement of D. MINIS, *of Beaver Plain, Beaver county, Pennsylvania.*

Hogs are not much raised with us beyond the wants of the county, not being considered so profitable as other kinds of stock. The "China" breed is the most prevalent, though some keep the "Russian," the latter of which are not much esteemed on account of the cost of bringing them to maturity.

Pork is worth from 5 to 8 cents a pound; lard from 9 to 12½ cents.

Statement of ALBERT HOOPES, *of West Chester, Chester county, Pennsylvania.*

Hogs are raised here for home consumption, and a few for market. Several of the imported breeds have been tried, but all have given way to an "Improved Chester county" hog. Swine are generally kept in pastures during the summer, being allowed the slops from the kitchen, and the refuse milk from the dairy. When fattened with whole corn between the ages of six and eighteen months, they will gain about a pound a day.

The price of pork is from 9 to 10 cents a pound.

Statement of JAMES E. KENDALL, *of Poplar Grove, Kanawha county, Virginia.*

Hogs are regarded as indispensable stock in this county. They grow large, and do well on acorns and beech mast. The only attention required is to keep them tame. A cross of the Berkshire and China breeds suits us best.

POULTRY AND EGGS.

CONDENSED CORRESPONDENCE.

Statement of GEORGE P. NORRIS, *of Newcastle, Newcastle county, Delaware.*

I have devoted much time to the poultry department of the farm; and, though at present the great mania for large fowls appears to have subsided, it cannot be said that our people have not been benefitted in having their attention called to the improvement of the various breeds.

The "Large Shanghai" fowls generally introduced throughout the country, are by no means the most profitable. They are regular, but not extraordinary layers, and grow very rapidly, but are enormous eaters. The principal benefit to be derived from them will be the cross obtained between them and the smaller breeds.

Of all the fancy fowls, I prefer either the "Black Spanish," or the "Polands." The former are handsome, of moderate size, hardy,

easily kept, and great layers, in consequence of which they have obtained the name of "everlasting layers."

The Poland fowls resemble the Spanish in everything except appearance. They are jet black, with a characteristic white top-knot, and are by many considered the handsomest variety known. Having had some experience with each breed, I can unhesitatingly recommend them, as they are well adapted to the wants of the farmers of the Middle States.

I should have mentioned, however, that none of the breeds noticed above are good sitters; therefore, a few hens of other breeds should be kept for the purpose of hatching the eggs of these, and rearing the young.

INSECTS.

INSECTS FREQUENTING THE COTTON-PLANT.

BY TOWNEND GLOVER.

The cotton-plant furnishes food for numerous insects, some of which feed exclusively upon the leaf, some upon the flower, while others destroy the young buds and bolls. It is my purpose to describe these insects, not in the order of their classification by natural families, but according to the part of the plant they most generally frequent, or to which their ravages are chiefly confined. Thus, by referring to the parts injured, one can easily recognise the insects, or their larvæ, which attack them in any of the stages of their existence.

Many of these insects at first appear in small numbers, and only become formidable in the second or third generation; for instance, if a female boll-worm produce 500 moths, one-half of which are males and the other half females, the next generation, if the increase be in the same ratio, will amount to 125,000 catterpillars or moths; and all this is accomplished in the space of a few weeks. It will therefore be perceived that their destruction depends upon prompt and timely action; and planters may materially aid in carrying out a work designed for their mutual benefit, by minutely observing the habits and characteristics of these pests of our fields, devising means for their destruction, and communicating the results of their observations and experiments, through some appropriate channels, to the public.

Insects injurious to the cotton-plant consist of those very destructive to the general crops, such as the boll-worm, cotton caterpillar, and some others; and those which do comparatively little injury, their numbers thus far not being sufficiently great to cause much damage, such as the leaf-rolling caterpillar (tortrix) and several

insects hereafter mentioned. There are still others, which do not materially injure the crop itself, such as the span-worm, and others which only feed upon the petals or pollen of the flowers. There are also many insects found in the cotton-fields which do no damage whatever to the plant, but merely feed upon weeds and grass growing between the rows, such as the caterpillar of the *Argynnis columbina*, which feeds upon the passion-vine, and that of the *Zanthidia niceppe*, which sometimes devours the Maryland cassia, and produces the beautiful orange-colored butterflies, seen in vast numbers hovering over moist or wet places on the plantations.

A class of insects which is highly beneficial, comprehends the larvæ of the lady-bird, the ichneumon flies, and many others, that are ever on the search for living victims amongst the noxious tribes, and which serve to keep the numbers of the latter within proper bounds.

Thus, it is highly necessary to be able to recognise the injurious from the comparatively innoxious as well as the useful insects, and I have therefore thought proper to describe and figure most of those which infest the cotton-fields, as many of them feed upon or injure the plants in one state or another; and, although they may do but little injury at first, yet, were they to multiply as fast as some others, they would eventually become as great a nuisance as the boll-worm is at present. According to a communication from Colonel Whitner, of Tallahassee, in Florida, the latter insect was scarcely known in that region before the year 1841; but it has since increased to such an extent as to cause an immense yearly loss to the planters.

Several methods of destroying insects on plantations and elsewhere have been recommended, one of which is the use of fire or burning torches. The innumerable myriads of nocturnal moths, being attracted by the lights, burn their wings as they hover around, and are either destroyed at once, or disabled from flying about to deposit their eggs in distant parts of the field. A species of lantern has been used for entrapping such as are attracted by light, and with some success. It is formed of a top, bottom, and back, made of wood, with a glass front and sides, a little more than a foot square, according to the size of the glasses used. The front is supported by a pillar at each corner; on the inside of the back of the lantern is fastened a tin or glass reflector. The three glazed sides consist of two panes, sliding in grooves, made in the top and bottom boards, and meeting in the middle at an angle of about 120°, instead of one pane, as in common lanterns. These panes can be slipped in and out, so as to leave a space open between them, larger or smaller as may be desired. A lamp is placed in the centre of the bottom, protected from insects and wind by a common glass chimney, which protrudes through a hole in the top. All the bottom of the box inside of the glass having been previously cut away, excepting a circular place on which to put the lamp, it is then deposited on a vessel or barrel covered with cloth, having an aperture cut in it corresponding with the bottom of the box, and the vessel beneath, containing molasses, or some other adhesive substance. The insects which may be flying about will be immediately attracted by the light, and approach the angle of the panes until they shall have entered the aperture, when, once within,

and not being able to fly out again, they will come in contact with the heated glass chimney, and thus be precipitated into the vessel beneath, in which they will perish.

Another plan, which it is hoped may, upon experiment, be found applicable to the enemies of the cotton-plant, has lately been reported as having proved efficient as a means of destroying the tobacco-worm, in Florida. This worm is the larva of a large moth commonly known by the name of the "tobacco-fly," (*Sphynx carolina*,) which is in the habit of feeding upon the nectar, or honey, contained in flowers, over which it may often be seen in the evening, poised in the air in a manner similar to that of the humming bird, making a buzzing noise with its wings, and busily employed in extracting the sweets by means of its long trunk.

As it had been previously observed that these moths are particularly fond of the Jamestown weed, (*Datura stramonium*,) a plan adopted in Florida as an effectual means of destroying them, and which it is said has succeeded to a considerable extent, has been communicated to this Office by Mr. Jesse Wood, of Mount Pleasant, in that State, who says:—

"About five years ago, Mr. Igdaliah Wood, of this vicinity, endeavored to poison the fly that produces the horn-worm, by applying a preparation of cobalt and sweetened water to the flower of the tobacco-plant. He found some difficulty in consequence of the cup of this flower not being in a favorable position to retain the poison. Mr. George Sunday next tried the bloom of the gourd-vine with better success. Mr. E. Johnson afterwards used the Jamestown weed, which answered the expectation of the most sanguine. The preparation consists of about a pint of water, a gill of molasses or honey, and an ounce of cobalt. After inserting a quill through the cork of the bottle, he let fall a few drops of this mixture into the cup of the flower about sunset. As this poison will soon kill the stalk of the Jamestown weed, the best plan is to break off the blossoms, make a hole in the ground, and place them in it. It is thought that the flies find them quicker than when left upon the stalks. It is certain to destroy the moths, although they frequently live until ten o'clock the next day, notwithstanding they are disabled from flying or depositing their eggs soon after taking the poison.

"I consider this discovery of immense value to tobacco planters, and, if it or any similar method should lead to the destruction of the cotton caterpillar and boll-worm, which is highly probable would be the case, it will be of incalculable benefit."

From this statement, it will be seen that, if such a plan is really of utility when applied to the cotton-fly, there can be no reason why it should not answer also in regions where honey-bees are not kept, for all such insects as are attracted by sweet substances; and it is to be hoped that experiments will be made the ensuing season, and reported for the public good. The thing to be chiefly desired now is, to find out the favorite food of the particular kind of insect to be destroyed; then to discover and use some efficient poison for the accomplishment of the purpose. If, however, birds should perish

from feeding upon these poisoned insects, it will somewhat militate against the advantages of the plan.

Several experiments were made in Florida by the writer, on the utility of using arsenic, cobalt, and strychnine, as means of destroying insects, some few of which succeeded, while many failed. In several instances, the insects would not touch the mixture at all.

Honey or sugar and rum, when rubbed on the bark of trees, will attract and intoxicate several species of insects, and might sometimes be advantageously used. Many planters in the Southern States recommend the berries of the "China-tree," or "Pride of China," (*Melia azederach*,) to be put around cabbage-plants, in order to prevent the attack of the cut-worm; and, as it is already known that these berries have an intoxicating effect upon the robins which eat so freely of them, they may have the same narcotic properties when applied to insects. It is at least worth while to make the experiment. Whale-oil soap, mixed with water, in proper proportions, thrown upon plants infested with plant-lice (aphides) is almost certain to destroy them. Flour of sulphur is stated to be useful when applied to grape-vines, or any other plants which are infested with the red spider or are attacked by a fungoid growth. A mixture of a gallon of water, a gallon of whiskey or other spirit, and four ounces of aloes, was highly recommended in Florida as a certain remedy against the attacks of the orange scale insects; but, with some who have tried it, although all the insects appeared to be destroyed, in a few weeks they reappeared, showing that the wash would have to be continually repeated until all the eggs under the scales had hatched and the younger broods were killed. Perhaps the same mixture might be successfully used for several other kinds of insects.

But, while so many artificial modes are recommended to accomplish the destruction of insects, planters are very apt to overlook the great daily benefits derived from other agents which have been kindly provided by Nature to check their undue increase. These agents are the birds, which constantly destroy them in any of their varied forms, larva, pupa or perfect insect. Mocking-birds and bee-martins catch and destroy the boll-worm moth, and many others, even on the wing, when the latter first appear upon the plantations, and thus materially diminish their numbers. If the fields are ploughed in the fall, many insects and chrysalides, which would otherwise come out in safety in the spring, are turned to the top of the furrow-slice, and either fall a prey to the ever-busy birds, or perish from exposure to the wintry frosts.

The nimble and graceful lizards of the South also act beneficially to the planter, as they are constantly on the alert, and catching every insect that chances to alight in their way. Toads, also, do much good, as they wander principally during the morning and evening hours, as well as in cloudy weather, and entrap insects by means of their viscid tongues. Such benefactors as these should be preserved, and not injured or killed as they often are. One pair of wrens or blue-birds, in a Northern garden, or of mocking-birds, on a Southern plantation, will accomplish more in destroying insects injurious to vegetation than can be imagined by one who has not studied their

habits, or watched them with attention, when busily engaged in searching under every leaf, or in every fissure of the bark, for their insect prey.

INSECTS FOUND UPON THE STALK.

THE CUT-WORM.

I have not been able this year (1855) to procure specimens of the worms which cut off the young plants early in the season, (Pl. VI., fig. 1,) as I arrived in the region of cotton-fields after their ravages had ceased; but, from the authority of able and scientific planters, I am induced to believe that they are very similar in habits and appearance to many of the cut-worms of the gardens, which penetrate the earth close to a plant, and at night emerge from their retreats to gnaw it off at or near the ground.

A gentleman in Florida, who had been troubled with this pest, informed me that a particular spot of four or five acres in his field had been literally thronging with cut-worms, so that most of the plants were either eaten off or destroyed, and that, finally, fearing the loss of his whole crop, he turned into the enclosure some twenty or thirty young pigs, which soon discovered the worms, rooted them up in great numbers, and fattened on the unaccustomed diet. The cotton was not injured, as the pigs were too young to root deep enough to destroy the plants. The pigs remained where the worms were to be found, never troubling any other portions of the field, and their strong powers of scent enabled them to detect their insect prey even when buried in the earth.

Should the moths of this cut-worm be like those of their congeners of the North, and attracted by light, it might be well to use a lantern like that already described, or to ascertain the favorite substance upon which they feed, and poison them, as suggested in the case of the tobacco-fly.

INSECTS FOUND ON THE LEAF.

THE COTTON-LOUSE.

(*Aphis?*)

When the cotton-plant is very young and tender, it is particularly subject to the attacks of the cotton-louse, (Pl. VI. fig. 2,) which, by means of its piercer, penetrates the outer coating, or parenchyma of the leaf or tender shoots, and sucks the sap from the wound. The under part of the leaves or young shoots are the places mostly selected, and the constant punctures and consequent drainage of sap enfeebles

the plant and causes the leaf to curl up, turn yellow, and subsequently fall to the ground. The young lice are extremely minute, and of a greenish color; but when they become older, they are about a tenth of an inch in length, and often dark green; but, in some instances they are almost black. It is conjectured that the color somewhat depends upon the health of the plant as well as that of the insect, or perhaps, upon their food, as I have seen green and black lice promiscuously feeding upon the same plant. The female produces her young alive throughout the summer, when she may often be seen surrounded by her numerous progeny, sucking the juice from the leaves and still producing young. Some naturalists state that the females, late in the fall, produce eggs for the generation of the next spring. If so, it is in order to preserve the species, as the insects themselves are easily killed by frost and cold; and their increase would be incalculable were it not that Nature has provided many enemies among the insect tribes to prevent their too rapid multiplication. Both males and females are said to possess wings at certain seasons; but the females and young in summer appear to be wingless. The end of the abdomen of both sexes is provided with two slender tubes, rising like horns from the back, from which often exudes the "honey-dew," or sweet gummy substance, seen sticking to the upper sides of the leaves beneath them, and which forms the favorite food of myriads of ants. Although young plants are mostly attacked, yet I have seen old "stands" in Georgia, with their young shoots, completely covered with this pest as late as November.

The principal insects that destroy the aphides are the lady-bird, the lace-fly and the syrphus, all of which wage incessant war upon them, and devour all they can find. Another fly, the ichneumon, likewise lays an egg in the body of the louse, which, hatching into a grub, devours the inside of the still living insect until it eventually dies, clinging to the leaf even in death, and the fly makes its appearance from the old skin of the aphis.

When old cotton-plants are suffering from the attacks of the louse, many planters cause their tops to be cut off and burned, and by so doing partially succeed in destroying them; yet, when we consider that, by this method, many young blossoms and "forms" must likewise be destroyed, it must be confessed that the remedy is almost as bad as the disease. In a garden or green-house, a solution of whale-oil soap, from a syringe, showered upon the upper and under parts of the foliage, has been used with much advantage; yet, upon the extended scale of a cotton plantation, such a remedy is altogether impracticable, and, until we can collect further information upon this subject from intelligent planters, we must rest content with the instinct of our insect allies.

GRASSHOPPERS.

(*Locusta?*)

Grasshoppers, or, more properly speaking, "locusts," occasionally do much damage to young cotton-plants, as they not only feed upon

the tender leaves; but have been caught in the very act of devouring the petals of the flowers in the fields of Georgia, as late as the month of November; but, as at this time the grass on which they usually feed abounds between the rows, the damage done by them to the general crop is but slight.

Several species of grasshoppers, or locusts, infest old cotton and grass-fields, some of them being of large size and possessing great powers of flight. (Pl. VI. fig. 3.) It may, however, be observed, that the true locust is not the insect generally known by that name in the United States, which is in reality a harvest-fly, (cicada,) usually inhabiting trees, where it makes an incessant buzzing noise which may be heard at a great distance during the summer and autumnal evenings. The shape of the harvest-fly is much clumsier and broader than that of the real locust, and the under wings are not folded up like a fan, under a wing-case, but transparent, stiff, and veined.

The real locust is similar to the grasshopper in shape, but the body is more robust, the antennæ shorter, and its flight much longer and more vigorous. Its under-wings, also, when at rest, are folded up in fan-like plaits under the outer wing-covers. Grasshoppers and locusts are produced from eggs as perfect insects, with legs and antennæ. They are able to run about and leap with great agility, but are entirely destitute of the rudiments of wings, except in the pupa state. It is only the perfect insects which are able to perpetuate their kind. They are generally furnished with ample wings which enable them to fly from field to field. Grasshoppers and locusts do much harm, when very numerous, to grass and vegetables, and even to fruit-trees, as well as to cotton. Turkeys, ducks, and other fowls feed upon them with great avidity, and are very useful in diminishing their numbers. In some of the Northern States, they have been destroyed by means of sheets spread upon poles, so as to sweep them into a bag fastened behind, which is drawn over the fields infested by them; they are then killed by means of boiling water or fire.

THE LEAF-HOPPER.

(*Tettigonia?*)

The leaves of the cotton-plant are often injured by the leaf-hopper. (Pl. VI. fig. 4.) This small insect is found upon the plant in the larva, pupa and perfect state. In all these forms, it sucks the sap from the leaf, causing small diseased and whitish-looking spots, much disfiguring the foliage, and injuring the plant itself, when the insects are very numerous. They are also found in great numbers on grape-vines, in Florida, and injure the foliage to a considerable degree.

The perfect insects are very small, measuring only from one-tenth to three-twentieths of an inch in length. The head is somewhat crescent-shaped, of a green color, with two red spots on the upper surface. The thorax is also green, with two crescent-shaped spots of red on each side of a small red spot in the centre. The wing-cases are green, with two stripes or bands of red, running parallel down each wing-

case, from the thorax to the upper margin, where they form an acute angle. The legs are yellowish-green, the hinder pair being much longer than the others, and furnished with bristles on the tibia. In the larva state, they are able to leap with great agility; but it is only in the perfect state that they are able to fly, the under-wings being hidden by the wing-cases, and not perfectly developed in the larvæ or pupæ. There are several species of these insects found upon cotton, which it will not be necessary here to describe, as their natural history and habits are nearly the same.

In using the lantern already described, it was found that thousands of these small insects were attracted from some grape-vines in an adjoining field. The use of fires or lights may therefore be recommended to destroy them, when they become very numerous, although, as regards the cotton, they are not often found on it in numbers sufficient to do much harm.

THE COTTON CATERPILLAR.

(*Noctua zylina.*)

The leaves of the plant are sometimes entirely devoured by what is commonly known to planters as the "cotton caterpillar," or "cotton army-worm." (Pl. VI. fig. 5.) It does not appear every year in immense numbers, but at uncertain intervals. This season, (1855,) it first made its appearance in the vicinity of Tallahassee about the month of August, on the plantation of Mr. Hunter, and then spread gradually through the rest of the plantations in that region. In October, it had already committed considerable ravages in several of the cotton-fields, not so severe, however, as had been anticipated, though the crops on several plantations were somewhat injured.

The perfect insect, or fly, when at rest, is of a triangular shape, the head forming one, and the extremities of the wings the other two angles. The color of the upper-wings is reddish-grey, a dark spot with a whitish centre appearing in the middle of each. The under-wings are of a dark reddish-grey. The moth of this caterpillar loses much of its greyish cast when it becomes older, and the down has been rubbed from the wings. It then assumes more of a reddish tinge.

The perfect flies, or moths, are easily attracted by lights, and may be found resting in the day-time on the walls or ceilings of rooms, attracted there, no doubt, by the candles or lamps on the evening before. If undisturbed, they will remain motionless during the day; but, as night approaches, they fly off with much vigor and strength. When in the open air, they may be found among and under the leaves of the cotton-plant, as well as those of the weeds which surround the plantation. The eggs are deposited principally on the under sides of the leaves, but often upon the outer calyx; and I have even found them, when very numerous, upon the stem itself.

Wherever these caterpillars were very abundant, I counted from ten to fifteen eggs on a single leaf, which are very small, and difficult to be distinguished from the leaves themselves, on account of their green color. In shape, the eggs are round and flat, and, when examined under a microscope, they appear regularly furrowed or ribbed. Their color, when freshly deposited, is of a beautiful semi-transparent sea-green. They are closely attached to the leaf on which they are laid. I am thus particular to state this, because, in an able article published some time ago, it was alleged that "the egg is fixed upon the leaf by a small filament attached by a glutinous substance." This mistake might the more easily be made by any person who had not himself observed the eggs when hatching, as that of the lace-wing fly is held by such a filament, and, moreover, is found in similar situations on the leaves, but generally with or near a colony of plant-lice, where the instinct of the parent lace-wing fly teaches it to deposit its eggs, and thus provide for a supply of fresh food for the young larvæ, which feed upon and destroy millions of the cotton-lice. There is a great difference also between the eggs of the caterpillar moth and those of the boll-worm moth, the first being, as before stated, round and flattened in shape, and green in color, whereas those of the boll-worm moth are not flat, but more of an ovoid shape, and of a dirty-yellowish tinge. I cannot state exactly what time is required to hatch the eggs after they have been laid by the parent fly, as I could not succeed in procuring any from the moths hatched and kept in confinement, although carefully preserved for the purpose. Dr. Capers says that it requires from fourteen to twenty days; but the eggs I found in the fields invariably hatched within a week from the time they were brought into the house. However, this must depend a great deal upon the state of the atmosphere and the warmth of the season. The young caterpillars, when hatched, very soon commence feeding upon the parenchyma, or soft, fleshy part of the leaves, and continue to do so until they become sufficiently large, and strong enough to eat the leaf itself. They are able to suspend themselves by a silken thread when shaken from the plant. They change their skins several times before attaining their full growth, when they measure from one and a half to nearly two inches in length. The first brood of caterpillars, in August and September, were all of a green color, with narrow, longitudinal, light stripes along each side of their bodies, and two broader light-yellowish stripes along each side of their backs, down the centre of each of which was one distinct, narrow, light-colored line. Each of the broader bands was marked with two black spots on each segment; and on each segment of the sides were three or more dark dots. The head was yellowish-green, spotted with black. The caterpillars of the second and third generations are of a much darker color than those of the first; their under parts are more of a yellowish-green, and their sides sometimes of a purple cast; their backs are black, with three distinct light-colored lines running down their length; and their heads are also darker, and of a yellowish-brown, spotted with black.

The question naturally arises, What causes this change of color in the latter part of the season, since the moths hatched from the lightest

and darkest caterpillars prove to be exactly the same? Several planters attribute it to the influence of the sun, or to the food upon which they subsist; but this can scarcely be the case, as I have often observed individual caterpillars, evidently of the second or third generation, of the lightest green color, amongst a crowd of the black worms on the same leaf, as late as October, and exposed to the same influences of the sun.

These insects appear to multiply to the greatest extent in damp, cloudy weather. When the older caterpillars are suddenly touched, they have the habit of doubling themselves up and springing to a distance of several times their length, but when undisturbed, and not feeding, they appear to rest on the leaf with the fore part of the body elevated and somewhat curved, whereas, sometimes they keep up a species of swinging or jerking motion from side to side, as if enjoying the heat of the sun.

This caterpillar is furnished with six pectoral, eight ventral, and two anal feet, of which, however, the two anterior ventral ones are imperfect, small, and apparently useless, so that its mode of progression somewhat resembles that of the span-worm, or looper, of the North, elsewhere described.

In fifteen or twenty days after the caterpillar has attained its full size, it ceases to feed. It then doubles down the edge of a leaf, and fastens it with its own silk to the main part of the same leaf, or by webbing several leaves together, forming thereby a very loosely-spun cocoon. In this, it transforms into a chrysalis, which, at first is green, but in a short time after changes to a chestnut-brown, or even to almost black.

The first brood I raised, were fifteen days in the chrysalis state, before making their appearance as perfect moths; but, as this happened in a cold room and screened from the sun, I am of the opinion that, when they are exposed to a warm sun, in the open fields, the time must necessarily be much shorter. I raised one caterpillar late in the fall, which was even thirty days before emerging from its cocoon; but this I attributed entirely to the cold weather, and non-exposure to the sun. This fact would tend to show that the hatching of the chrysalis may be delayed, by peculiar circumstances, until long after the natural time.

The tail of the chrysalis is furnished with several small hooks, bent inward, by means of which it is enabled to hold fast to the loose web of which the cocoon is formed, while emerging from the chrysalis skin, or, in case of accident, to prevent it from falling out of the cocoon during the prevalence of strong winds.

There have been many speculations regarding the origin and periodical visits of this moth. In 1843, Mr. Whitemarsh B. Seabrook read a "Memoir on the Cotton-plant" before the State Agricultural Society in South Carolina, in which he says: "That the cotton-moth survives the winter is nearly certain; an examination of the neighboring woods, especially after a mild winter, has been often successfully made for that purpose. They were seen by the writer in May last, in the edge of a belt of pines, within a few yards of a cotton-field. In the winter of 1825, Benjamin Reynolds, of St. John's, Colle-

ton, found them in the woods, principally on the cedar-bush, encased alive in their cover, impervious to water, and secured to a twig by a thread. The pupæ, wrapped in cotton leaves, from their bleak exposure, invariably die on the approach of cold weather."

From what was stated to me by some of the best planters in Florida, last summer, it would seem that this caterpillar appears on their plantations more or less, almost, if not every year, and sometimes in a most unaccountable manner. Mr. E. Richards, of Cedar Keys, furnishes a statement which would seem to prove that it is migratory in its habits, as there is no other method of accounting for its sudden presence, except that, having previously existed on some other plant, or weed, it had left it for food more congenial to its taste, although it has been asserted that the real caterpillar will eat nothing but cotton. He says: "The last of July, 1845, these caterpillars made their appearance in a small field of three or four acres of Sea-Island cotton, planted on Way Key, as an experiment to see if cotton could be advantageously cultivated on the Keys, no other cotton having been previously planted within 80 miles of them; but the whole crop was devoured. The caterpillar was at the same time destroying the cotton in the interior of the country."

In a statement made this season by Mr. William Munroe, of Gadsden county, Florida, to the Agricultural Department of the Patent Office, he appears to think Sea-Island cotton not so liable to be attacked as the short-staple, when the two varieties are planted together. In his letter he says: "I observed, when I had two fields of cotton adjoining, the one short-staple and the other Sea-Island, and the cotton caterpillars made their appearance, that they always destroyed the short-staple cotton first. Four years ago, my crop was destroyed by the worm, and at that time they ate every green leaf on the short-staple cotton before they attacked the Sea-Island. This year (1855) my short-staple crop was destroyed by the worm, on the Appalachicola river, and I observed that after the short-staple crop was all eaten, several Sea-Island stalks in the field, at a little distance, seemed to be uninjured; but, upon close examination, it was found that the worm had just commenced upon them. My impression, from the above observation is, that, if we in this country were to confine ourselves to the production of the Sea-Island cotton, the attack of the caterpillar would be much less frequent, or would probably altogether cease."

In regard to the periodical visitations of these caterpillars, Dr. Capers remarks that their first appearance, as destroyers of cotton, was in the year 1800, and that, in 1804, the crops were almost destroyed by them. A snow-storm occurred, however, and swept them away; but they were found the succeeding seasons, though in smaller numbers. In 1825, they were spreading, but perished again by a storm. In 1826, they destroyed the crops. The first notice of them in this year was on the first of August, at St. Helena. Soon after, they were found on all the seacoast, from New Orleans to North Carolina. On the 23d of the same month, they had destroyed almost all the cotton leaves, but suddenly left the plant, though not for the purpose of webbing, as many of them were young. The cause of their sudden

disappearance is stated to have been that they were too much exposed to the powerful effects of the sun, in consequence of the plants being nearly destitute of foliage, and not protecting them from its direct rays.

Colonel Benjamin F. Whitner, of Tallahassee, has also written an interesting article on the depredations of this caterpillar in that vicinity. "In 1835," says he, "the crops were entirely exempt from the ravages of the caterpillar. In 1836, it appeared by the first of October, but did no harm. In 1837, no mention is made of it. These notes were made in Madison county, Florida."

Colonel Whitner then moved to Leon county, in the same State, where, in 1838, the caterpillar appeared early in August. The second brood stripped the plants by the 20th of September, and were so numerous that, after devouring the entire foliage, they barked the limbs and stalks, and ate out bolls nearly grown. In 1839, they were less numerous, and appeared late. In 1840, they came out from the 15th to the 20th of July, and, by the 6th of September, the plants were stripped of their leaves and young bolls, so that the entire crop was less than half of the average of other years. In 1841, this caterpillar was seen in Madison county from the 15th to the 20th of August, and in Leon county between the 20th of August and the 1st of September. The loss was serious, comprising probably one-fifth of the crop. In 1842, no damage was done. In 1843, they appeared near Tallahassee on the 1st of August, and plantations were stripped by the 15th of September. The crop was cut off from one-third to two-fifths by the caterpillar and storm. In 1844, the cotton-worm was found webbed up on the 13th of July, and by the 15th of September some plantations were entirely denuded; yet, in other parts of the county, the ravages were only partial. In 1845, there was no appearance of the caterpillar. In 1846, it was found webbed up by the 7th of July. The second brood began to web up on the 26th of that month; and by the 20th, the parts of the field in which the worm was first seen were found to be eaten out, and the fly, the worms, large and small, and the chrysalides, were discovered at the same time, a state of things never observed before. By the 5th of September, the damage amounted to a loss of more than one-half of the crop. In 1847, although the fly was seen on the 16th of July, no injury was done to the crop. In 1848, it was but slightly injured; but the year 1849 was particularly marked by the ravages of the caterpillar, as well as that of 1852.

Colonel Whitner further observes that these worms appear in successive broods, and accomplish the cycle of their transformations in from twenty-six to thirty days, which has also been corroborated by others.

A caterpillar hatched from the egg, under my own inspection, however, passed twenty days before webbing up; but, as it had been kept in confinement in a cold room, most probably the growth was not so rapid as it would have been in the open air and exposed to the warmth of the sun. The skin was shed five times during the period of its growth, and on the twentieth day, the caterpillar began its web.

In a very interesting communication from Mr. E. N. Fuller, of Edisto Island, South Carolina, he describes the depredations of the caterpillar in his neighborhood as follows:—

"In 1840, I discovered their ravages, confined to the luxuriant portions of the fields, near the seacoast of this Island. The larvæ were destroyed in the latter part of September. In 1843, they were first heard of by the 1st of September, when their ravages, limited as in 1840, were quite perceptible at some distance. A frost on the 18th of that month probably destroyed them. In 1846, they appeared on the 20th of July; and, by the 10th of September, I suppose there was scarcely a cotton leaf or any tender portion of the plants remaining, and the worms not fully grown deserted the ravaged fields in millions in search of food, failing to find which they died from starvation. The crop of this Island was about 40 per cent. of an average one. In 1849, the caterpillars made their first appearance on the 22d of August; their ravages this year, being confined to the low spots, caused no injury of moment. In 1852, they were found on the 10th of August, about 40 miles to the southward, and on this Island about the 20th of the same month. They disappeared here, however, without doing injury.

"Thus they have appeared at regular intervals of three years. In 1855, when they were again looked for, an intense drought from the early part of July was sufficient to prevent their increase, had they made their appearance. The old planters say that, in 1804 and in 1825, they appeared as in 1846; that is, in periods of twenty-one years.

"As near as I can judge, not having made any record, the length of time from the hatching of the egg to the chrysalis is twelve days; remaining four days in the chrysalis state and six days more to the hatching of the egg. This seems to be the case in a season of moisture and heat, without which, their progress would probably be more slow."

Among the many remedies recommended for this fly, or moth, fires and lights in the fields have been highly spoken of as attracting and destroying the miller. But even this may have its disadvantages, as Colonel Whitner, who has tried it, states that "it not only attracts the flies from other plantations, but that multitudes of moths perished in the flames." An article likewise appeared in some of the Southern papers, not long since, recommending white cotton flags, about a yard square, to be placed in the field, by which the moths are attracted, and upon which they deposit their eggs. Plates similar to those recommended for the boll-worm have also been used with partial success. But, to destroy this pest, it will be necessary to ascertain exactly the date of the appearance of the first moths, and then to exterminate them in the best manner, and as quickly as possible. Could not some favorite aliment be found on which the moth prefers to feed, as in the case of the tobacco-fly, and then poison them with some effective agent? This would at once rid the fields of the first broods of moths, the progeny of which, in the second and third generations, might devastate half the fertile plantations of the South.

THE GRASS CATERPILLAR.

Another insect, (Pl. VI. fig. 6,) which is often found in cotton-fields, and mistaken for the real cotton-caterpillar, is commonly known by the trivial name of the "grass-worm," or "caterpillar," owing to the circumstance of its most natural food consisting of grass and weeds, although, when pressed by hunger, it will sometimes eat the leaf of the cotton-plant.

These caterpillars were very numerous in the vicinity of Columbus, in Georgia, about the end of September and the beginning of October, 1854. They devoured grass, young grain, and almost every green thing which came in their path. Instances have been known in which, urged as they were by necessity and starvation, they actually devoured stacks of fodder that were stored away for winter consumption. Deep ditches cut in the earth to stop them were immediately filled up by the multitudes which fell in and perished, while eager millions still rushed over the trembling and half-living bridge, formed by the bodies of their late companions, bent on their mission of destruction and devastation.

These caterpillars do no essential injury to the cotton, especially when weeds abound, as they content themselves with the grass growing between the rows; and, unless very numerous, they cannot be classed among those doing much harm to the general crop, and are mentioned here principally as having been so frequently mistaken for the real cotton-caterpillar. When pressed by necessity, however, as has already been stated, they will feed upon cotton leaves. I raised about thirty of them upon this food alone, merely as an experiment, and they grew and perfected their transformations, although appearing to prefer a grass diet if it could be obtained. When about to change, they formed cocoons of silk under stones or in the ground near the surface, interwoven with particles of earth, and came out perfect moths from the 24th to the 30th of October; and, as these specimens were kept in a room without artificial heat, I conjectured that those in the open fields would appear about the same time.

At a plantation in the vicinity of Columbus, where the caterpillars were very numerous, and had already devoured all the grass on one side of a field, which was divided into two equal parts by a broad and sandy carriage-road passing through the centre of it, the grass on the other side having been untouched, it was interesting to observe the operations of numerous colonies of ants that had formed their holes or nests in the road, and were lying in wait for any unfortunate grass-worm, the natural desire of which for a fresh supply of food, should tempt it to cross this dangerous path. First, one ant more vigilant than the rest would rush to the attack; then another, and another, until the poor caterpillar, entirely covered by its pigmy foes, and completely exhausted in strength by its unavail-

ing efforts to escape, was finally obliged to succumb to superior numbers and die as quietly as possible, when the carcass was immediately carried off by the captors to their nests, or, when too heavy to be dragged away at once, they fed upon it as it lay in the road. This warfare was carried on every day as long as the grass-worms prevailed, and no doubt their numbers were diminished in this way to a considerable extent.

The grass-caterpillars, when in confinement, very often kill and devour each other; and, when one is maimed in the least, it stands a very poor chance for its life. Several intelligent planters state that, when the grass and weeds are entirely devoured, and no other vegetable food is to be found, they will attack each other and feed upon the still living and writhing bodies of their former companions. One grass-caterpillar, which was kept in confinement, although furnished with an abundance of green food, actually appeared to prefer to feed upon other caterpillars, no matter of what kind, so long as their bodies were not defended by long, bristling hairs, or spines.

The grass-caterpillar is from an inch and a half to an inch and three-quarters in length. A longitudinal light-brownish line runs down the centre, and two yellow lines along each side of the back, which is somewhat veined with black lines, and is of a dark color, marked with black spots, from each of which grows a short bristle, or hair. Below these yellow stripes, the sides are of a dark color, almost black; beneath this, extends a light-colored line, in which the spiracles are placed; the lower part of the body is of a dirty green, spotted with black; the head is black, marked with two lines of a yellowish color, forming an angle on the top; the body is somewhat hairy. This caterpillar has six pectoral, eight ventral, and two anal feet.

The above description applies only to the brightest-colored specimens of the grass-worm, as they vary much in color and markings, some of them being almost black, and showing indiscriminately their stripes. The chrysalis is brownish-black, and is formed in a cocoon of silk under the ground, the sand and small pebbles being so interwoven with it as to cause the whole cocoon to appear like an ovoid ball of earth; but it is never found webbed up in the leaves, as is the case with the true cotton-caterpillar, already described. The moth measures about an inch and one-fifth across the wings when they are expanded; the upper-wings are grey, slightly clouded with a darker color, and a lighter spot or ring is faintly seen in the centre; the under-wings are of a yellowish-white, shaded with grey along the margin near the upper wings.

Specimens of these caterpillars were brought to me when at Savannah, in Georgia, and they were suspected to have injured the rice in that vicinity in the month of June. Colonel Whitner, of Tallahassee, in his interesting communication to this Office, speaks of the grass-caterpillar as having stripped fields of grass, in 1845, and also as attacking the corn, sugar-cane and upland rice. It has likewise been said that an insect similar, if not identical with the grass-caterpillar, destroys the leaves of the sweet potato. Thus it appears to be almost omnivorous, and not choice in its selection of food, like the

true cotton-caterpillar, which is believed to confine itself to the cotton-plant alone.

The grass-worm cannot be classed among those insects very injurious to cotton, although instances have been known where it has destroyed the foliage to some extent. It is more especially mentioned here as being found in cotton-fields, and often confounded with the true cotton-caterpillar. The difference, however, is more plainly described under the head of the latter.

The same remedies are applicable to this insect as have been suggested for the boll-worm caterpillar, or any other night-flying moth.

THE RED SPIDER.

(*Acarus?*)

Much injury is done to the cotton-leaf by a minute red spider, (Pl. VI. fig. 7,) which presents very much the appearance of incipient rust, except that the leaf is of a more rusty-brown in spots, instead of the bright-yellow of the real rust. This red spider principally attacks the under side of the leaf, the spots caused by its punctures turning brown, and finally increasing until it is completely stung all over, and falls from the plant.

This insect is extremely minute, and when on the leaf, it can scarcely be discerned by the naked eye. Some of the young appear to be of a greenish cast; but, when they are advanced in age, the abdomen assumes a dark crimson shade, with darker maroon spots upon its upper surface. The legs, which are hairy, are eight in number.

This family of the mites (acari) do much injury to vegetable life, as they are so extremely minute as to escape the notice of the superficial observer. When they infest grape-houses, or rose-bushes, it has been recommended to dust the leaves while moist with flour of sulphur.

THE DROP OR HANG-WORM.

(*Œceticus?*)

The "drop-worm," as it is commonly called, (Pl. VI. fig. 8,) is occasionally found upon the cotton-leaf, but generally infests the arbor-vitæ, larch, and hemlock-spruce. It is also found upon many of the deciduous-leaved trees, such as the linden, negundo, and maple. Dr. Harris states that the female worm never quits her case, but lays her eggs in the skin of the chrysalis, in which she herself also remains until the eggs are all deposited, when she closes the end with down, and crawls out of the case and dies. These eggs being hatched, the young worms, after they are hatched, make little silken cocoons, open at both ends, and are covered with fragments of leaves, twigs, &c., in which they conceal themselves, and drag them about wherever they move. These cases are enlarged as the insects increase in size, and are still carried about by the worms. When they change

their places, they protrude their heads, the first three segments of the body, and six legs, from one end of the case; but, when the insects wish to rest, each case is fastened by a few threads to the leaf or branch, and they retreat within. When shaken from the tree by an accident or by high winds, the worms are able to suspend themselves by means of small threads, and hang in the air; hence the name. When young, they are often blown from tree to tree, and thus carried to a considerable distance from the place where they were hatched.

The males and their cases are much smaller than those of the females, the worm being only about an inch in length. The first three segments of the body are whitish, marked with black lines and spots; the segments where they join are brownish; the head is marked with wavy lines of black on a white ground; the rest of the body is of a dirty, blackish-green. It has six pectoral feet, by means of which it moves from leaf to leaf, with its body and case, the latter either perpendicularly suspended in the air or dragged by the worm from behind. There are eight very small ventral, and two anal feet, by means of which it clings to the inside of the case. The chrysalis measures about three-quarters of an inch in length, and contains the rudiments of wings, legs, head, and antennæ, like other moths, and is of a dark-brown. The perfect moth comes out in autumn, and measures across the expanded wings about an inch and three-twentieths. Its body is downy, and of a blackish-brown; the wings are semi-transparent, and scantily clothed with blackish scales, which are blackest on the margins and veins; the antennæ are covered at their tips, and are doubly feathered from the base to beyond the middle. The female is much larger than the male, and never leaves her case, but changes into the perfect insect in the shell of the chrysalis, and only emerges from it when the eggs are laid within. The young, after leaving their maternal case, in the spring, immediately commence their cases, and spread over the native tree or any others that may happen to stand near.

These insects are a great nuisance wherever they once get established, as they are exceedingly prolific. One female chrysalis case, which was dissected, contained seven hundred and ninety eggs, while others have been found to contain nearly a thousand.

These pests are very rarely seen on the cotton-plant, and even when such is the case, they may have been blown there from the cedars, maples, or other deciduous-leaved trees in the woods on the edges of the plantations. They are the more particularly mentioned here, from the fact that, if taken in time, they may easily be exterminated on deciduous-leaved shade-trees; for, as I have before stated, the female cases contain all the eggs, which may be seen in winter, hanging on the branches when the leaves have fallen, and even are large enough to be distinguished when on evergreens. It would therefore require but little trouble to pull them off in the autumn and winter, and burn them, so that neither males nor females should escape. If this course were pursued two or three years in succession, there would not be so many complaints in our cities about the drop-worms destroying the foliage of the trees.

THE CORN EMPEROR-MOTH.

(*Saturnia io.*)

The foliage of the cotton-plant is also eaten by the caterpillar of a large moth, denoted on Pl. VI. fig. 9. This spiny and stinging caterpillar is often found upon the leaf of cotton in September; it feeds likewise upon the blades of Indian corn, and the leaves of the willow, balsam-poplar, dogwood, and many other trees. Whenever one of them is found in a field, the plants attacked by it may be easily distinguished by their leafless appearance in the midst of the otherwise green and flourishing vegetation, as it rarely quits a plant before it is completely denuded. Often, however, those which have lost their leaves from the rust present much the same blighted appearance; but, in this case, the numerous yellow, withered leaves, which are scattered on the ground, at once indicate the disease.

The thorny spines with which these caterpillars are armed have a peculiarly poisonous property, and are capable of inflicting painful and severe wounds, similar to the sting of a wasp. It is therefore necessary, if the insects require to be touched, to use a stick or branch, when removing them from the plants on which they feed.

These caterpillars cannot be classed among those very injurious to cotton, as they do not appear to be sufficiently numerous to effect much damage. Very few complaints have been made about them by the planters either of Georgia or South Carolina; but this year, (1855,) the same caterpillar was found very abundant in the cotton-fields near Tallahassee, but the damage done by them was trifling.

Mr. Newman, of Philadelphia, who has paid much attention to the breeding of caterpillars, states that this insect is found on the willow. Dr. Harris says, they are also found upon the balsam-poplar and elm, in Massachusetts; and, according to Smith and Abbot, in their "Insects of Georgia," it is found on the dogwood, sassafras, and Indian corn, which are devoured by them.

This caterpillar is from two inches and a quarter to two inches and three-quarters in length; but, as Dr. Harris has minutely described them, I will quote his own words:

"The caterpillars are of a pea-green color, with a broad, brown stripe, edged below with white, on each side of the body, beginning on the fourth segment and ending at the tail. They are covered with spreading clusters of green prickles, tipped with black, and of a uniform length. Each of these clusters consists of about thirty prickles, branching from a common centre, and there are six clusters on each of the rings, except the last two, on which there are only five, and on the first four rings, on each of which there is an additional cluster low down on each side. The feet are brown, and there is a triangular brown spot on the under-side of each ring, beginning at the fourth." The brown stripe mentioned by Dr. Harris is often of a reddish-brown, and, in high-colored and healthy individuals, I have seen it almost of a carmine red.

The caterpillars are gregarious when young; but, when older, they are solitary. When fully grown, they form a brownish cocoon of a

gummy substance among the leaves, resembling parchment. The perfect moth comes out the following spring. It is said that there are two broods of these insects in a season, in the Southern States; but I have not observed the caterpillars on cotton later than September.

The chrysalis is brown, and of a short, thick form, with a number of hooked bristles on the tail.

The following is Dr. Harris' description of the moths: "They sit with their wings closed and covering the body like a low roof, the front edge of the under-wings extending a little beyond that of the upper-wings and curving upwards. The sexes differ both in color and size; the male, which is the smallest, is of a deep or Indian-yellow color; on its fore-wings there are two oblique, wavy lines towards the hind margin, a zigzag line near the base, and several spots so arranged on the middle as to form the letters A H, all of a purplish-red color. The hind-wings are broadly bordered with purplish-red, next to the body, and near the hinder margin there is a narrow curved band of the same color. Within this band, there is a curved, black line, and on the middle of the wing a large, round, blue spot, having a broad, black border and a central white dash. The fore-wings of the female are of a purplish-brown, mingled with grey; the zigzag and wavy lines across them are also grey, and the lettered space in the middle is replaced by a brown spot surrounded by an irregular grey line. The hind-wings resemble those of the male in color and markings; the thorax and legs are purplish-brown, and the abdomen is ochrey yellow, with a narrow, purplish-red band on the edge of each wing. These moths expand from two inches and three-quarters to three inches and a half."

The only method that can be taken to destroy these insects would be to kill the moths when and wherever found, and to strike the caterpillars from the plants and then crush them under foot. Although they cannot properly be classed among the insects very injurious to cotton, not being sufficiently numerous to do much harm, yet, if left undisturbed, they may so increase as to become a nuisance to the planter both of cotton and corn.

THE COTTON TORTRIX.

(*Tortrix?*)

When the margins of the leaf of the cotton-plant are found rolled up and fastened to the main part by means of a loose web of silk, it is often discovered to be the work of the small tortrix, (Pl. VII fig. 1.,) which makes this shady retreat in order to shelter itself from the sun and rain, as likewise for a place of concealment from birds and other enemies. Sometimes, however, these leaves are similarly rolled up by a spider, as a suitable nest or receptacle for its eggs; but, when this is the case, the inside will be found to contain a silken bag in which the eggs either have been or are about to be deposited.

When disturbed, this caterpillar always retires into its place of shelter, and, if forcibly driven out, it is able to retreat backward from the open end, and to suspend itself in the air by a thread, which issues

from its mouth, having previously fastened the other end of this thread to the leaf from which it had fallen. The leaves attacked by this moth can be distinguished from those that are perfect, by their rolled-up and distorted appearance; and either this insect, or one very similar in habits and appearance, sometimes attacks the young and tender ends of the cotton-shoots, which are often seen webbed up into a mass and partially eaten out.

The caterpillar, when full grown, is about an inch in length, of a bright-green color, with a brownish or black head, and has a helmet-shaped black mark on the first segment of the body. It has six pectoral, eight ventral, and two anal feet; the two anterior pair of pectoral ones being dark-colored.

The chrysalis measures from three-fifths to seven-tenths of an inch in length, is of a brown color, somewhat spiny, and furnished with four hooks at the end of the tail, by which it is enabled to hold fast to its web. The chrysalides were formed in semi-transparent cocoons of loose silk among the leaves; and in about fourteen days, the perfect moths came out. The moth at rest has a somewhat bell-shaped appearance, the upper-wings suddenly becoming quite broad a short distance from the thorax. They are of a chestnut-brown color, with an oblique dark-brown band forming an obtuse angle near the middle; and, on the inner margin of each wing, a rather more indistinct band runs near the body. The tips are also banded with dark-brown. The under wings are yellow, with a blackish-colored mark on their margins and sides, while the under-side is yellow and more or less shaded.

I should judge, from the small numbers of these caterpillars, that they do comparatively little, if any injury to the main crop, and no doubt the moths would be attracted by lights or fires placed in the field at night, as recommended for the moth of the cotton-caterpillar. The same plan would also serve to diminish their numbers, should they ever increase.

THE YELLOW CATERPILLAR.

There is a yellow, hairy caterpillar found on the cotton-plant in September and October, which devours the leaf. The specimens observed in South Carolina and Georgia appeared to be of solitary habits, not congregating together, like the cotton-caterpillar and grass-worm, but feeding alone on the plant.

The young of these insects are of a much lighter color than those nearer maturity. The ground color of the old caterpillar is yellow, profusely specked and shaded with small black dots; a yellow longitudinal line runs along the side below the spiracles; on each segment of the body, rise numerous small yellowish-brown excrescences, or warts, from which issue tufts of long brownish-black hairs. The head is black, with a yellow stripe running down the middle. It has six pectoral, eight ventral, and two anal feet. The cocoons are ovoid in shape, formed on or near the surface of the ground, and constructed of silk intermingled with gravel, particles of soil, and the hairs from their own bodies. These caterpillars are reputed to be capable of

stinging; but, as I repeatedly handled them with impunity, their poison, if any, cannot be very powerful.

The chrysalides, which are dark-brown, approaching to black, appeared about the end of September, and were quite short and thick. I cannot describe the perfect moth, as, unfortunately, the chrysalides did not live to perfect their last transformation. These caterpillars, although described as infesting cotton, cannot be classed amongst those very injurious, as they did not appear in numbers sufficient to injure the general crop.

There is a red, hairy caterpillar of like characteristics, that sometimes eats the cotton-leaf, but which it is unnecessary to describe here.

THE COTTON ARCTIA

(*Arctia?*)

A species of arctia (Pl. VII. fig. 2) was also found in Tallahassee, in the month of July, upon the cotton-plant; but, most probably, the parent moth had wandered away from its more natural food, as the identical kind of caterpillar was found at the same time upon the brambles by the roadside near that place. The plant attacked, however, was in the middle of the field, and not near any brambles nor weeds, on which the eggs might have been laid. The bare stem and branches of the cotton were covered with the unsightly web, and all but a few straggling caterpillars had disappeared, having probably webbed up preparatory to the final change.

The full-grown caterpillar is from an inch and one-tenth to an inch and three-tenths in length; the back, dark-colored, and covered with tufts of long, blackish-grey hairs; the sides are of a pale-greenish color, with a line between the black and green distinctly marked; the six pectoral feet and head are black, and the eight ventral and two anal ones are green.

The chrysalides were formed on the 24th of July, in cocoons or loose webs, intermingled with its own hair, and spun under the loose leaves. They were nearly half an inch in length, short and thick in form, and brown in color. The moths came out in about twelve or fourteen days.

The wings of the male measure, when expanded, from nine-tenths of an inch to an inch across, and are white, with one or two black dots near the centre of the upper pair; the eyes are black; the antennæ feathered, and the two fore-legs of an orange color.

The female is much larger than the male, measuring about an inch and one-fifth across the expanded wings. She is very similar to the male in color, but has no black spot on the upper-wing; nor are the antennæ feathered as in the male.

I consider, from the circumstances under which the nest, or web, of caterpillars was found, that it was accident alone which caused their presence on the cotton, as I have never seen them before nor since, in any number, among the plants. Therefore, they may be classed among those insects which cause little or no harm to the general crop.

These moths are similar to the *Arctia textor*, of Harris, but appear to differ from them in the spots on the upper-wings of the male, and in some other slight particulars. The habit of webbing up the limbs is also the same.

INSECTS FOUND ON THE TERMINAL SHOOTS.

The insects attacking the terminal shoots of the cotton-plant are at present very little known; but when their habits shall have been more thoroughly investigated, there is no doubt that they will be found to be much more destructive than is generally supposed.

No practical planter can have passed through his cotton-fields, without frequently observing that the terminal leaves of many of the plants have been webbed up and eaten out, or that many of the young blossoms have suddenly turned brown, or "flared" open, and, on the slightest touch, fall to the ground. Some of this damage may no doubt be caused by excessive moisture, or heat, or by an unhealthy state of the plant itself. But if the ends of all the shoots be closely examined, it will generally be found that several minute insects lie hidden between the folds of the leaves and buds, probably feeding upon the tender foliage, or extracting the sap. The aphis, or cotton-louse, is often found in such places.

THE PEA-GREEN CATERPILLAR.

In the cotton-fields near Tallahassee, many of the tender leaves and young blossoms of vigorous and healthy plants were observed to be webbed together in a mass. Upon opening one of them, a small caterpillar, (Pl. VII. fig. 3,) between three-fifths and seven-tenths of an inch in length, was discovered feeding upon the interior. This caterpillar is of a pea-green color, with a dark longitudinal stripe running down the middle of the back, and a row of two dark spots with white centres to each on every segment of the body, except the first, running parallel on each side of the dark stripe. The head is black; the first segment of the same color, with a dividing line of white between it and the head, and another light division between this and the second segment. The pectoral feet are black, and the body sparingly clothed with short bristles, or hairs.

This caterpillar, for the most part, lives and feeds in the terminal shoots; but I have found it webbed up between the outer calyx and boll of the cotton, or in the calyx of the flower.

The chrysalis, which is of a light-brown color, is about two-fifths of an inch in length, and is formed in the same webbed-up terminal shoot which served the caterpillar as a shelter. It shed the caterpillar-skin about the 27th of September, and the perfect moth came out in about ten days.

The moth, when expanded, measures from three-fifths to seven-tenths of an inch across the wings; the body and thorax are of a

brown color; the upper-wings light-brown, with a band of darker brown, running obliquely across them near the centre (one specimen had two dark oblique lines on the upper-wing); a dark triangular mark occurs on the upper side of the wing; between the margin and band, and the margin itself is of a dark-brown; the under-wings are yellowish-brown; the under side of the wings is brown, marked crosswise by darker lines, giving it somewhat a marbled appearance; and the antennæ are threadlike. The distinguishing feature of this small moth is the very long and dark-colored palpi, which are somewhat curved upwards, and project from the front of the head like a trunk.

The damage done by these small insects is not so apparent at first as that caused by those of a larger size, such as the boll-worm and others; yet, no doubt, many of the buds and leaves on the terminal shoots are destroyed by them. These webbed-up leaves, however, must not be confounded with the webs made by numerous small spiders, which also select such places for their abodes, and no doubt do good by destroying many young caterpillars and moths.

Young cotton-buds are frequently observed at the end of the terminal shoots, turning brown, and eventually dropping off. This has been attributed to the agency of the young larvæ of the "bore-worm," or "boll-worm," which certainly are sometimes found in the terminal shoots of cotton; but, when this is the case, the buds are generally either eaten from the outer calyx, or the bud itself perforated and the former flaring open; whereas, the buds, which turn black, as before described, are closely enveloped in the outer calyx, and present a triangular form with a dry and dark-brown appearance.

THE COTTON LYGÆUS.

(*Lygæus?*)

Upon close examination, a number of extremely minute larvæ, (Pl. VII. fig. 4,) measuring a little over one-twentieth of an inch in length, were found in the injured shoots. The insects, when confined in a bottle with some young terminal cotton-shoots and buds, to ascertain if they really injured the plant, were observed immediately to attack each other with great animosity; and, in a short time, one of the strongest larvæ killed and sucked out the juices from three of its companions, and also from a cotton-louse which had been placed in the glass. The same insect, however, was afterwards plainly seen on several occasions, to suck sap from the terminal shoot and young buds; and as there were no more insects for it to feed upon, it must necessarily have perfected its growth and transformations afterwards on vegetable juices alone. Almost every terminal shoot which was diseased had in it one or more of these minute larvæ or perfect insects.

The pupæ are of a reddish-brown, about one-twentieth of an inch in length, with eyes of a reddish-brown color. The perfect insect is rather more than one-twentieth of an inch in length, also with reddish-brown eyes, yellowish antennæ, and a head and thorax black; the triangular space between the wings is black; the wings are brown-

ish-yellow, barred in the centre with two triangular black marks; the ends of wings diamond-shaped, of a light color; the upper part of the thigh is black; and the rest of the leg yellowish.

This insect is more especially mentioned here in order to draw attention to the various tribes which attack the terminal shoots of cotton, as at present very little appears to be known about them, and immense numbers of young buds dry up and fall in the manner mentioned above, unobserved from their minute size. Many of them are no doubt cast in consequence of atmospheric and various other causes; but, as this small insect has been observed sucking the juices from the plant, it may be found that several others do the same thing in different localities. The young boll-worm is, no doubt, found in these shoots; but I very much doubt whether the fallen blackened buds are owing to injuries received from it, as will be seen in the article on that worm. It is true, the young boll-worm causes many immature forms to drop, but in such cases the bud attacked generally shows where the injury has been done, by a small puncture.

As several of the reduvii or cimicidæ, have the power of stinging man and animals in a very severe manner, with their probosces, or piercers, may they not in some measure possess the same power over vegetable life? The question is merely asked to lead to further enquiries on the subject.

SAP-SUCKERS.

Another insect, (Pl. VII. fig. 5,) found in the young shoots and newly-formed bolls, the color of which is green; the eyes reddish brown; the legs green, with the thighs red; the antennæ are four-jointed, and also green, with red at the end of each joint. The pupa is about a quarter of an inch, and the perfect insect is seven-twentieths of an inch in length; the antennæ are brown and green, the eyes brown; the thorax somewhat triangular; the anterior part green, and shaded with reddish-brown, posteriorly; the legs, brown and green; the wing-cases with a cross, shaped like the letter x, forming four triangles, those nearer the thorax being reddish-brown; the side triangles are green.

I observed these insects, when confined under glass, sucking the sap from the buds and young bolls, their only food. The young eventually completed their transformations into perfect insects. They were observed, moreover, to eject large drops of green sap from their abdomens, which could only have been procured from the buds themselves. As it has been already seen that these insects puncture the bolls and extract the juices therefrom, the question arises whether they do any material injury, either by this extraction of the sap, or by a poisonous sting, like some of the reduvii.

There is likewise another of the same species of insect, (Pl. VII. fig. 6,) which was found perforating the young flower-buds and bolls of the cotton, similar to the above. The head and anterior portion of the thorax are reddish-brown, the remainder of the thorax yellow, with a double dark mark in the middle; the wing-cases are brownish-black, with two longitudinal yellow lines from the upper

outside corner of the wing-cases to the posterior edge, forming a dividing mark somewhat shaped like the letter x.

THE CENTRINUS PERSCILLUS.

(Denoted by Pl. VII. fig. ,) about three-twentieths of an inch in length, of a greyish color, with a rather long, curved rostrum, or bill, was found in the terminal shoots, as well as in the blossom; but I could not perceive that in any way it injured the plant. I have also seen very young boll-worms in the terminal shoots, but, upon examination, I have generally found the egg deposited upon the outer calyx of a young bud or boll, the parenchyma, or tender succulent substance, of which, was mostly eaten, and the young bud pierced or its contents sucked or eaten out.

INSECTS FOUND ON THE FLOWER.

The flower of the short-staple cotton is of a yellowish-white color the first day of its blooming; it then gradually assumes a pinkish tinge towards its outer edge; the second day, it partially closes, turns pink, and presents such an entirely different appearance that it can scarcely be recognised as the same flower.

There are several insects which infest this flower, or "bloom," as it is frequently termed, some for the sake of the nectar, or honey; others for the pollen; and a few for the corolla itself.

THE BLISTER-FLY.

(*Cantharis strigosa.*)

Several blister-flies, or cantharides, found in Columbia, South Carolina, were seen to devour the petals of the cotton-flower. One of these insects is a little more than half an inch in length, (Pl. VII. fig. ♂,) of a reddish-brown color, with the eyes and a spot on the head black. Two long black marks are seen on the thorax, and two longitudinal stripes, also black, on each wing-case; the legs and antennæ are black; and the abdomen protrudes somewhat beyond the wing-cases. Some of them are smaller than others, measuring not quite half an inch in length, and are of a rusty ash-grey white; others are of the same color, but with two broad, longitudinal black stripes on the elytræ. The two last mentioned vary so much in the distinctness of their stripes, some of them being the medium between the perfectly grey and the striped, that it is somewhat difficult to determine whether they are the same insect or not. The under-wings are clouded, and nearly black.

These insects, although they eat holes in the petals, do but little, if any damage to the crop; yet, together with the chauliognathus,

bees, and wasps, may, perhaps, be beneficial, as serving to fecundate many plants by carrying the pollen from flower to flower.

THE COTTON-CHAULIOGNATHUS.

(*Chauliognathus pennsylvanicus.*)

This insect (Pl. VII. fig. 9) does not appear to attack the petals in the same manner as the cantharides, just described, but contents itself with the pollen or nectar, which is found in the flower, where it may be often seen so much occupied in feeding as scarcely to take any notice of the approach of mankind. It is so plentiful near Columbia, in South Carolina, that four or six may be taken from one bloom alone. When issuing from the flower, they sometimes appear to be so abundantly powdered with pollen as to be perfectly yellow, and no doubt serve in some measure beneficially, as a medium for transporting the pollen and fertilising other blooms.

This insect is not quite three-quarters of an inch in length; its head, eyes, and antennæ are black; its thorax, orange, with a large, dark spot in the centre; its wing-cases are orange-yellow, with a black, longitudinal, broad stripe running down each, near the inner margin, leaving a narrow inner and broad outer margin of yellow orange. This black stripe grows broader towards the abdomen, leaving a narrow stripe, also of yellow, at the end of the elytræ. Its legs are black.

THE YELLOW-MARGINED-WINGED CHAULIOGNATHUS.

(*Chauliognathus marginatus.*)

A small species of chauliognathus is found in Florida, (Pl. VII. fig. 10) where it appears to take the place of the last mentioned insect, having the same habits, and occuring in the same places. It is nearly half an inch in length; the head is orange-yellow, with a black mark below the eyes, which are also black; the thorax is yellow, with a longitudinal black mark down the centre; the wing-cases are black, edged around the outer and inner margins, and the end with orange-yellow; the lower part of the thighs is also orange-yellow; the upper part and rest of legs and antennæ are black.

This insect frequents the flowers of the cotton, but, as yet, I have never discovered it doing any injury.

THE DELTA-THORAXED TRICHIUS.

(*Trichius delta.*)

A small beetle, which is a little more than two-fifths of an inch in length, (Pl. VII. fig. 11,) is also found in cotton-blooms, and sometimes on the bolls. The head is black, including several white marks; the thorax is also black, bordered with yellow, containing a singular triangle of yellow lines, the lower end of which appears as if broken

off; the wing-cases are reddish-brown, with two oblique black spots on the upper, and two longitudinal black ones enclosing a yellowish mark on their lower parts; the abdomen protrudes the twentieth part of an inch beyond the wing-cases, and is of a yellowish color; the fore-legs are spiny and of a brown color; the hind-legs are very long, brown, the ends of the tibiæ and tarsi black.

From what has been seen of the habits of this insect, and its comparative scarcity, I should not regard it as injurious to the crop, and therefore, I would class it amongst those insects frequenting the cotton but not injurious to it.

TWELVE-SPOTTED GALEREUCA.

(*Galereuca duodecimpunctata.*)

A small leaf-beetle (Pl. VIII. fig. 1) is often found in the young flowers of the cotton, where it gnaws holes in the petals. This insect is about three-tenths of an inch in length; the head is black; the thorax orange-green; the wing-cases greenish-yellow, with six black spots on each; the upper part of the thighs is green, and the rest of the leg dark-colored, or nearly black.

Among the remedies suggested for destroying the striped cucumber-beetle, (*Galereuca vittata,*) Dr. B. S. Barton, of Pennsylvania, recommends "sprinkling the vines with a mixture of red pepper and tobacco." Ground plaster and charcoal dust have also been recommended, as well as watering the vines with a solution of an ounce of glauber salts in a quart of common water, or tobacco water. An infusion of hops, elder, or walnut leaves is said to be very useful; as, likewise, sifting powdered soot upon the plants when they are wet with the morning dew. Others have advised sulphur and Scotch snuff to be applied in the same way.

Dr. Barton likewise states that, "as these insects fly by night, as well as by day, and are attracted by lights, burning splinters of pine knots, or of staves of tar-barrels, stuck in the ground during the night, around the plants, have been found useful in destroying these beetles." Similar remedies might possibly apply to the twelve-spotted galereuca.

As these insects are not sufficiently numerous to do any harm to the cotton-crop, these remedies are merely mentioned as applying to the cucumber-beetle, or any other pests of the garden or fields, of similar habits.

SPAN-WORMS, OR LOOPERS

(*Geometræ?*)

Among the numerous insects which injure the flowers of the cotton-plant may be found several caterpillars, many of which are of the kind termed "loopers," or "span-worms," from their peculiar mode of locomotion.

Near Columbus, in Georgia, I found a species of caterpillar, (Pl. VIII. fig 2,) which were quite numerous, about an inch and a half in length, and of a bright-green color, eating the petals of the cotton-flower, from the 12th of October to the 29th of November. They had six pectoral, four ventral, and two anal feet, and were obliged to loop their bodies when progressing from place to place, after the manner of the so-called span-worms, or loopers. Their bodies were green, and slightly hairy. The chrysalides were seven-tenths of an inch in length, and of a green color. The moth, with wings extended, measures about an inch and three-tenths, is of a shaded or clouded blackish-brown, with a metallic, gold-colored semi-circle near the centre of each upper-wing; a round spot of the same color also lies close to it, but nearer the margin; the under-wings and body are of the same blackish-brown. When at rest, the upper-wings come together like the roof of a house; a tuft of hair projects from the upper part of the thorax, and a smaller tuft is found near or between the junction of the wings, which appear to curve up towards the outer margin.

ANOTHER CATERPILLAR

Is of the same habits, size, form, and color, except that it has a white longitudinal line running down each side. The chrysalis, however, is of a dark-brown color, whereas, that of the preceding is always green, with dark-brown markings only on the thorax and back. The moth also is similar in shape and color—so much so, indeed, as to warrant a belief that they may be different sexes of the same species.

Mr. Peabody, of Columbus, states that this caterpillar was very destructive to the leaves of turnips, in 1854. Several, which were placed in confinement, were attacked by a singular and fatal disease. However healthy they appeared at first, they gradually assumed a lighter color, ceased feeding, became swollen, and, suspending themselves by the hind feet to any projecting twig, very soon died and became putrid and black.

These caterpillars were quite plentiful in the vicinity of Columbus, but were not found in Florida the following year. They cannot be classed among insects very injurious, as they were not sufficiently numerous to harm the cotton.

THE SMALL COTTON SPAN-WORM.

A very small looper-caterpillar, or span-worm, (Pl. VIII. fig. 3,) about seven-tenths of an inch in length, of a brown or greenish color, with five yellow and black markings or bands on the middle segments, and of about the thickness of a knitting-needle, was very numerous on the blossoms of cotton in Georgia during the month of October.

These caterpillars, having six pectoral, with only two ventral, and two anal feet; their mode of progression is by alternately stretching out and contracting the body in the form of an arch. They are thus enabled to advance nearly half their length every stride, or step,

and, from this circumstance, derive their common name of "span-worm," or "looper."

The favorite food of these insects appeared to consist of the petals. In some places, they were very numerous, as many as four having been taken from one bloom alone. In color, they varied much from green to brown; but both were similarly banded with another color. The chrysalides were fixed by the tail to the leaves with a glutinous matter or silk, and measured about seven-twentieths of an inch in length; were of a brownish-green color, and remarkable for having the upper part of the thorax somewhat square, flat, and furnished with two minute protuberances, or spines, over the head and eyes. When disturbed, they instantly drop from the leaves, and suspend themselves in mid-air, by means of a thread, which issues from the mouth; and although exceedingly abundant in one part of the field, yet they were scarcely to be found out of that particular spot.

As these insects are very small, and eat holes in the petals of the flowers alone they cannot injuriously affect the general crop.

THE LARGER SPAN-WORM.

Another span-worm, or caterpillar, (Pl. VIII. fig. 4,) appears in the Carolinas, Georgia, and Florida, early in October, and feeds upon the petals of the cotton-flower. It measures, when fully grown, from an inch and a half to an inch and three-fourths in length; the color is reddish-brown, marked with faint, longitudinal darker stripes; the head is somewhat angular, and divided at the top; there is a light spot on each side, about the middle of the body, and two short excrescences, or warts, on the extremity. In several specimens, there are white spots running down each side of the back. The chrysalis is a little more than half an inch in length, and is of a brownish color. The moth measures an inch and three-tenths across the expanded wings, which are of a light, clouded-grey color, with an irregular, dark, oblique line running across the upper-wing, and two others, not quite so distinct, nearer the body. There is also a dark, oblique line, and another fainter one, crossing the under-wing; the margins are scalloped with a darker color; the antennæ of the specimen figured are feathered.

This caterpillar feeds upon the petals of the cotton-flower, and, when disturbed, assumes a stiff, erect attitude, in which it might easily be mistaken by men or birds, for a dried twig or stick. When about to change, in October, it descends into the earth, becomes a brownish chrysalis, and in about fourteen days the moth appears.

The caterpillars are not very numerous, and therefore can do but little harm to the general crop.

Another span-worm, somewhat similar to the above in shape and color, is very numerous in cotton-fields, but feeds upon the bind-weed flower, (convolvulus,) and does not disturb cotton.

INSECTS FOUND UPON THE BOLL

During the time that cotton is maturing its seed-vessels, there are several insects of the "plant-bug" species found both upon the young and the old bolls; but whether these insects have anything to do in producing the rot, is a question which cannot be easily answered before further information shall have been collected upon the subject. I will here simply give the results of some experiments made by me this season (1855) to determine whether any of these insects do or do not suck the sap from the bolls. In the month of October, several plant-bugs were caught, and placed singly in glass bottles, containing young and middle-sized bolls, and all of those hereafter described were observed with their piercers penetrating the bolls, and busily engaged sucking out the sap.

THE GREEN PLANT-BUG.

(*Pentatoma?*)

This insect is about seven-tenths of an inch in length, rather broad, and of a bright-green color; the head is furnished with two ocelli on the upper part; the eyes are brown, and the scutellum, or triangular place between the wing-covers, is very large and also of a green color; the upper part of the body, which is flattened, is margined with an edge of yellow, and has a black spot on the yellow edge of each segment. The piercer, which is long and jointed, when not in use, is recurved under the thorax; the antennæ are five-jointed.

An insect was described by Mr. Bailey, of Monticello, in Florida, (Pl. VIII. fig. 5,) as being very numerous in his cotton-fields; and his overseer informed me that he had seen it in the very act of piercing a boll, which he afterwards cut open and found that the puncture had penetrated through the outer shell, or case of the boll, to the cotton, and that the mark where the piercer had penetrated was discolored. Those I had in confinement certainly were frequently seen with their trunks inserted into bolls, and sucking the sap.

The larva is very similar to the perfect insect in shape and color, but smaller in size, and is not furnished with wings. The pupa possesses rudiments of wings, only, and it is the perfect insect alone which, by means of a pair of under-wings, concealed beneath the wing-cases, is able to fly about and propagate its kind.

THE GREY PLANT-BUG.

(*Pentatoma?*)

The spotted plant-bug (Pl. VIII. fig. 6) is very much of the same shape as that last described, but is not so broad. It is grey, and marked with black dots and lines; it is also smaller than the former, being only three-fifths of an inch in length; the outer margin of the thorax is somewhat pointed or angular; the scutellum, broad and

triangular; and the wings, when closed, terminate with a black, diamond-shaped mark, where they overlap; there are two ocelli; the antennæ are five-jointed; and the appearance of the insect is flat, broad and similar to the so-called "squash-bug" of the North. This insect was often seen with its piercer inserted into a boll, extracting the sap, which was ejected from the abdomen as a bright, greenish liquid.

These insects were found plentifully on the cotton in Georgia, in 1854, and in Florida, in 1855.

THE RED-EDGED-WINGED REDUVIUS.

(*Reduvius?*)

A species of reduvius (Pl. VIII. fig. 7) was found in abundance in the cotton-fields of Florida, in 1855. The female measures a little more than three-fifths of an inch in length, and the male about half an inch. The head is of a greyish-black; the eyes prominent, black and brilliant; the antennæ are four-jointed; the thorax is triangular, with the angle towards the head, truncated, black, with an edging of red; the wing-cases are reddish, spotted with black, and edged with red, with their ends, where they overlap, black; the legs are black from half way up the thighs, where they are red; the underwings are clouded with black veins. It so closely resembles the celebrated "red-bug" of Eastern Florida that it has probably been mistaken for it by many planters, who have stated that the true red-bug is often found in Middle and Western Florida, where none are to be found, though I searched diligently for them.

These insects, when confined in glasses, were not observed to feed upon the sap of the bolls, although it probably does some injury, like the much dreaded red-bug alluded to above.

THE LI HT-BANDED-WINGED ANISOSCELIS.

(*Anisoscelis?*)

A species of anisoscelis (Pl. VIII. fig. 8) was found in abundance in the cotton-fields both of Georgia and Florida. It appeared to be very active and vigilant, as, however carefully approached, it always flew away with a loud, humming sound. Several of these insects were observed on a large boll, apparently busily employed; but when suddenly disturbed, they dispersed in different directions. Upon examining the boll, the sap was seen exuding from several minute punctures, which was attributed to these insects having bored into the boll for the sake of the vegetable juices contained therein.

The larva, when young, is of a light scarlet or crimson, with two black spots on the back, in which are two black, thorny excrescences, or points; there are also four black, thorny excrescences on each side; the legs, antennæ, and eyes are black; and the hind-legs thicker than the others.

The pupa is brown, with its wing-cases only in an incipient state,

and the tibiæ of the hind-legs have already attained a broad, flattened appearance.

The perfect insect is about seven-tenths of an inch in length; the antennæ are four-jointed; the eyes, prominent and brown; the piercer four-jointed, and when at rest, re-curved under the body; the ocelli are two in number; the thorax rising from the head, and somewhat angular on the margin; the wing-covers are reddish-brown, with a distinct yellowish-white band across the middle; the anterior and middle legs are reddish-brown; the hind-legs, however, are very singular in shape, the thighs being thick and spiny on their under side, and the tibia furnished with a broad flattened enlargement on each side, larger on the upper one and somewhat wing-shaped, with two teeth, or notches, on the margin. This makes the insect appear to have hind-legs entirely out of proportion to its size. These insects are very numerous in cotton-fields, and may be seen flying from plant to plant during the heat of the day.

There are several other insects found upon cotton; but those mentioned above are the most numerous. The question now arises whether they have anything to do with the "rot," or whether that disease is caused by a peculiar state of the atmosphere, or by imperfections of the soil. May not the punctures made by these insects, in some peculiar seasons, incline the boll to the rot more readily than in others, though in more favorable seasons it may be made with comparative impunity? A singular circumstance, however, is rather against the insect theory, namely, that, while some particular cotton-plant is observed to be much affected by the rot, the plants standing close to it may be comparatively free and healthy. On one diseased plant, I counted seventeen rotted bolls, while the very next plants were green, and exhibited not the least sign of disease. The query as to whether the rot is caused by insects or the peculiar state of the soil or atmosphere, is here submitted for the purpose of inciting planters to make experiments, and to report their success, in order that we may soon come to a definite conclusion upon the subject.

THE BROWNISH-BLACK ANISOSCELIS.

(*Anisoscelis?*)

A very large anisoscelis, (Pl. VIII. fig. 9,) about an inch and one-fifth in length, and of a brownish-black, I found quite numerous in the cotton-fields of Florida. The head of this insect is brownish-black, with prominent eyes; the thorax rough, black, and somewhat triangular; the antennæ, four-jointed; the legs, brown; the thighs, brownish-black and spiny; the hind-legs, in appearance, entirely disproportionate in size to the insect; with the thighs very stout, thick and spiny, and the tibiæ with broad, flattened, wing-shaped projections; the trunk is recurved under the thorax.

These insects, though somewhat numerous, were never observed to suck the sap from the bolls; yet it would be well to investigate their habits more minutely before deciding whether they are injurious or not.

THE DARK-SHADED CETONIA.

Cetonia Melancholica.

The beetle shown on Pl. VIII. fig. 9 is found on those bolls which have been bored into by the boll-worm, extracting the flowing sap from the lacerated sides of the wound. As many as five have been taken from the interior of a single boll, which had been previously hollowed out by the worm, and where the sap was flowing very freely. Some planters accuse them of making the holes in which they are found; but most of the bolls examined by me had evidently previously been hollowed out, and the beetles had only entered for the sake of the extravasated sap. Sometimes, however, they may so abrade the skin of a boll as to cause a flow of juice, of which they will avail themselves, as I have occasionally observed solitary individuals sucking the sap under very suspicious circumstances, where no previous wound had been made by the worm. They can do but little harm, however, to the crop.

This bettle is rather more than half an inch in length; of an ovoid form; greenish, with somewhat of a metallic lustre; across the wing-cases, are several whitish spots and short lines; the tail is obtuse, hairy, and protrudes beyond the wing-cases; the legs are rather spiny, of a dark color and metallic lustre.

THE INDIAN CETONIA.

(*Cetonia inda.*)

I observed another beetle, (Pl. VIII. fig. 10,) but very abundant, in the blooms, and sometimes in the open bolls of the cotton, in Florida, in October, which apparently did no injury. This beetle is three-fifths of an inch in length, and of a brown color, spotted and marbled with a darker brown and black. It flies with a loud-humming sound, and is apparently sluggish in its habits when not on the wing.

INSECTS FOUND ON ROTTED BOLLS.

Much has been said about the rotted bolls of cotton, the cause of which has been attributed to insects; and it has been alleged that, if these bolls were well examined, several of the insects causing the disease would always be found inside. It is true, many small insects are found in such rotted bolls, but they have invariably been previously cracked or split open by disease, or bored into by the boll-worm. The fact is, the insects found in such places frequent them merely for the sake of the sap which exudes from the wounds, or for the fungoid growth that generally flourishes in such situations.

It is very often the case that the effect is thus mistaken for the cause, and that insects perfectly innocent are blamed for a disease with which they have nothing to do, except that they resort to the already injured bolls for food or shelter.

The insects in decaying and rotted bolls of cotton are very numerous, but most of them are quite small.

ANOTHER INSECT

(*Carpophilus?*)

Was found in such bolls (Pl. IX. fig. 1) as were either bored into by the boll-worm, or had been split open by the rot, and did not appear upon the bolls unless they had been previously injured. I have counted as many as thirty of these beetles in a single diseased boll, and there is scarcely an injured or split boll in some fields in which one or more of them is not to be found. They likewise occur in considerable numbers in the tops of such ears of maize as have been eaten out by the corn-worm, (heliothes,) (see Report for 1854,) and have much of the sap exuding, or are covered with a fungoid growth. They appear to dislike light, and seek shelter in dark places, secure from the rays of the sun.

This insect is about the tenth of an inch in length, and of a brown color; the wing-cases are short, covering only about two-thirds of the abdomen. The larva is a small yellow grub, with six fore-legs, and two points at the end of the tail, and is often found in the rotted parts of the bolls.

If this insect were to be found in the bolls before they were already rotted, or to be seen in the act of piercing the outer case, it might, perhaps, with reason, be accused of causing the disease; but, as they are never found inside before the rot has commenced, it is very much to be doubted whether they have anything to do with it, or merely visit such places for the purpose of obtaining a food suitable to their taste, or a dark sheltered place in accordance with their habits.

THE SQUARE-NECKED SYLVANUS.

(*Sylvanus quadricollis.*)

The larva and perfect insect of this minute beetle (Pl. IX. fig. 2) has already been figured, in the Agricultural Report for 1854, where it is described as having been found in Indian corn. It also frequents diseased cotton-bolls, most probably for the sake of the seed, which is generally exposed to its attacks, when the boll has been split open by disease.

ANOTHER INSECT

Was also found very numerous in some of the rotted bolls; but as soon as the latter were taken from the plant and opened, the beetles ran off with great rapidity, and endeavored to hide themselves under any substance that would serve as a place of shelter. They appeared

to dislike the open light, and were generally found in dark and obscure places.

There were likewise several small insects found in rotted-bolls, such as the *Colastus semitectus*, and many others, which it will be unnecessary to enumerate here, as their habits are very much the same as those above mentioned, nearly all of them frequenting such places merely for food and shelter, and not causing the rot in any manner.

The hemipterous insects, heretofore mentioned, certainly do pierce the bolls with their beaks, or piercers, for the sake of the sap; for they have been caught in the very act, and this even before any appearance of the rot could be discovered. They might, therefore, perhaps, with better reason, be suspected of having something more to do with the disease than the small beetles already mentioned. But, even in this case, it would be well to investigate further before coming to a definite conclusion.

THE CORN-WORM.

(*Heliothes?*)

The caterpillar producing this small moth, (Pl. IX. fig. 3,) described in the Agricultural Report for 1854, as injurious to the Indian corn in the Southern States, is likewise found in the bolls of cotton which have been split open by the rot, but can have nothing to do with producing the disease. It most probably feeds upon the seeds contained in the rotted bolls.

The chrysalis is formed in a cocoon inside the boll; it is about one-fifth of an inch in length, of a brown color, and formed in a cocoon of silk, interwoven with fœces and dust from the boll.

The caterpillar is about three-tenths of an inch in length, of a reddish or pink color, with the head and part of the first segment brownish. It has six pectoral, eight ventral, and two anal feet, and is able to suspend itself by a thread, when disturbed. The body is slightly covered with a few short hairs.

The moths appear in about fourteen days, in warm weather, and, when expanded, measure nearly two-fifths of an inch; the upper-wings are of a shaded chestnut-brown, mottled with darker brown and black; the tips of the wings are marked with dark spots; the under-wings are very narrow, brown and deeply fringed with fine hairs, presenting almost the appearance of feathers. The insect, when at rest, places the upper wings together, forming a ridge with the extremity turned up. There appear to be several generations of these insects during the season, and, although found in rotted bolls, they are perfectly harmless as to the causing of disease.

There are several other insects found in rotted bolls which it will be unnecessary here to describe; for, although, as before stated, they are found in bolls already split open by the rot, or eaten into by the worm, yet they are no more the cause of the disease than the woodpecker is the cause of the death of the tree out of which it extracts the insects which have already accomplished its destruction.

THE BOLL-WORM.

(*Heliothes?*)

The egg of the boll-worm moth (Pl. IX. fig. 4) is generally deposited on the outside of the involucel, or outer calyx of the flower, and I have taken it from the outer calyx even of the young boll itself. It has been stated that the egg is laid upon the stem, which also forms the first food of the young worm; but, after a thorough and careful examination of several hundred stems, I found only one egg in this situation, and that, from its being upon its side instead of its base, had evidently been misplaced, and never hatched.

The egg of the boll-worm is laid singly upon the involucel, about twilight, and is of a somewhat oval shape, rather flattened at the top and bottom, and is formed with ridges on the side which meet at the top in one common centre. The color is yellowish until nearly hatched, when it becomes darker, the young enclosed caterpillar showing through the translucent shell. A single boll-worm moth, dissected by Dr. John Gamble, of Tallahassee, contained at least five hundred eggs, which differed much from those of the cotton-caterpillar moth, which are round and flattened like a turnip, of a beautiful green color, and scarcely to be distinguished from the leaf on which they are deposited. The eggs of the boll-worm moth hatched in three or four days after being brought in from the field, and the young worms soon commenced feeding upon the parenchyma, or tender fleshy substance of the calyx, on the outside, near where the egg was laid. When they had gained strength, they pierced through the outer calyx, some through the petals into the enclosed flower-bud, while others penetrated the boll itself. Sometimes the pistil and stamens are found to be distorted and discolored, which is caused by the young worm, when inside the bud, eating the stamens and injuring the pistil, so that it is drawn over to one side. When this is the case, the young worm bores through the bottom of the flower, into the young boll, before the old corolla, pistil, and stamens fall off, leaving the young boll, inner calyx, and outer calyx, or involucel, still adhering to the foot-stalk, with the young worm safe in the growing boll.

The number of buds destroyed by this worm is very great, as they fall off when quite young, and are scarcely observed as they lie, brown and withering, on the ground. The instinct of the caterpillar, however, teaches it to forsake a bud or boll about to fall, and either to seek another, or to fasten itself to a leaf, on which it remains until the skin is shed; it then attacks another bud or boll in a similar manner, until, at length, it acquires size and strength sufficient to enable it to bore into the nearly-matured bolls, which are entirely destroyed by its punctures; for, if the interior is not devoured, the rain penetrates the boll, and the cotton soon becomes rotten and of no value.

The rotted bolls serve also for food and shelter to numerous small insects, such as those already mentioned, and which have been erroneously accused of causing the rot. Whenever a young boll or bud is seen with the involucre, or outer calyx, called by some the "ruffle,"

spread open, it may be safely concluded that it has been attacked by the worm, and will soon fall to the ground and perish. The older bolls, however, remain on the plant; and, if many of the fallen buds or bolls be closely examined, the greater portion of them will be found to have been previously pierced by the worm, the few exceptions being caused either by the minute punctures of some of the plant-bugs, from rain, or other atmospheric influences. Those injured by the worm can be distinguished by a small hole on the outside where it entered, and which, when cut open, will generally be found partially filled with small fragments of fœces.

When very young, the boll-worm is able to suspend itself by a thread, if blown or brushed from the boll or leaf on which it rested. After changing its skin several times, and attaining its full size, the caterpillar descends into the ground, where it makes a silky cocoon, interwoven with particles of gravel and earth, in which it changes into a bright chestnut-brown chrysalis. The worms, which entered the ground in September and October, appeared as perfect moths about the end of November.

A boll-worm, which was bred from an egg found upon the involucel, or ruffle of the flower-bud, grew to rather more than a twentieth of an inch in length by the third day, when it shed its skin, having eaten in the meantime nothing but the parenchyma, or tender, fleshy substance from the outside. On the fifth day, it bored or pierced through the outer calyx, and commenced feeding upon the inner; and, on the sixth day, it again shed its skin, and had increased to about the tenth of an inch in length. On the tenth day, it again shed its skin, ate the interior of the young flower-bud, and had grown much larger. On the fourteenth day, it, for the fifth time, shed its skin, attacked and ate into a young boll, and had increased to thirteen-twentieths of an inch in length. From this time, it ate nothing but the inside of the boll, and on the twentieth day the skin was again shed, and it had grown to the length of an inch and one-tenth, but unfortunately died before completing its final change.

These moths probably lay their eggs on some other plants when the cotton is inaccessible, as a young boll-worm was found this season in the corolla of the flower of a squash, devouring the pistils and stamens; and, as there is a striking similarity between the boll-worm and the corn-worm moth, described in the Agricultural Report for 1854, in the appearance, food and habits, alike in the caterpillar, chrysalis, and perfect state, it will perhaps prove that the boll-worm may be the young of the corn-worm moth, and that the eggs are deposited on the young boll, as the nearest substitute for green corn, and placed upon them only when the corn has become too old and hard for their food.

Colonel B. A. Sorsby, of Columbus, in Georgia, has bred both these insects, and declares them to be the same; and, moreover, when, according to his advice, the corn was carefully wormed on two or three plantations, the boll-worms did not make their appearance that season on the cotton, notwithstanding that, on neighboring plantations, they committed great ravages.

The worms, or caterpillars, have six pectoral, eight, ventral and

two anal feet, and creep along with a gradual motion, quite unlike the looping gait of the true cotton-caterpillar, and vary much in color and markings, some being brown, while others are almost green. All are more or less spotted with black, and slightly covered with short hairs. These variations of color may perhaps be caused by the food of the caterpillar. Some planters assert that, in the earlier part of the season, the green worms are found in the greatest number, while the dark brown are seen later in the fall, as we know is the case with the cotton-caterpillar.

The upper-wings of the moth are yellowish, in some specimens having a shade of green, but in others of red. There is an irregular dark band running across the wing, about an eighth of an inch from the margin, and a crescent-shaped dark spot near the centre; several dark spots, each enclosing a white mark, are also discovered on the margin; the under-wings are lighter colored, with a broad, black border on the margin, and are also veined distinctly with the same color. In the black border, however, there is a brownish-yellow spot, of the same color as the rest of the under-wings, which is more distinct in some specimens than in others, but may always be plainly perceived; there is also, in most specimens, a black mark or line in the middle of the under-wings, on the nervure; but, in some, it is very indistinct.

These moths multiply very rapidly; for, as I have before observed, one female moth sometimes contains five hundred eggs, which, if hatched in safety, would rapidly infest a whole field, three generations being produced in the course of a year.

In an interesting communication from Colonel Benjamin F. Whitner, of Tallahassee, he states that the boll-worm was scarcely known in his neighborhood before the year 1841; and yet, in the short period of fourteen years, it had increased to such a degree as to have become one of the greatest enemies to the cotton on several plantations in that vicinity.

It has been recommended to light fires in various parts of the plantations, at the season when the first moths of this insect make their appearance, as they are attracted by light, and perish in great numbers in the flames; and, if the first brood of females be thus destroyed, their numbers must necessarily be reduced, as it is highly probable that it is the second and third generations which do the principle damage to the crops. Some successful experiments in killing these moths with molasses and vinegar were made by Captain Sorsby, a year or two ago, which I here describe in his own words:

"We procured eighteen common-sized dinner-plates, into each of which we put about half a gill of vinegar and molasses, previously prepared in the proportion of four parts of the former to one of the latter. These plates were set on small stakes, or poles, driven into the ground in the cotton-fields, one to about each three acres, and reaching a little above the cotton-plant, with a six-inch-square board tacked on the top, to receive the plate. These arrangements were made in the evening, soon after the flies had made their appearance. The next morning we found from eighteen to thirty-five moths to each plate. The experiment was continued for five or six days, distribut-

ing the plates over the entire field, each day's success decreasing until the number was reduced to two or three to each plate, when it was abandoned as being no longer worthy of the trouble. The crop that year was but very little injured by the boll-worm. The flies were caught, in their eagerness to feed upon the mixture, by alighting into it, and being unable to make their escape. They were doubtless attracted by the odor of the preparation, the vinegar probably being an important agent in the matter. As flies feed only at night, the plates should be visited late every evening, the insects taken out, and the vessels replenished, as circumstances may require. I have tried the experiment with results equally satisfactory, and shall continue it until a better one is adopted." It might be well also to try the lantern-trap before mentioned, as another means of destruction, and, likewise, the method of poisoning recommended in the general remarks on insects. As it appears from Colonel Sorsby's communication that the moth is attracted by, and feeds with avidity upon molasses and vinegar, could not some tasteless and effective poison be mixed with this liquid, so that all the early moths which might partake of it would be destroyed before laying their eggs?

A long caterpillar, (Pl. IX. fig. 5,) measuring from an inch and three-fifths to an inch and nine-tenths in length, and with a thick body, is sometimes found in bolls of cotton in similar situations as the boll-worm. It feeds likewise upon the leaf, and some specimens, which were confined in a box, devoured green corn from the ear. These insects vary much in color, some being of a beautiful velvet-black, while others are considerably lighter. The head of the caterpillar appears small for the bulky size of the body, and is black, with two stripes of yellow, forming an angle on the front. On each side of the back runs a longitudinal line, and below the spiracles is seen another line of a reddish or ruddy color. The under part is of a light-brown. It has six pectoral, eight ventral, and two anal legs, and its mode of progression is by a gradual creeping, the same as the boll-worm.

The chrysalides were formed under ground, in cocoons of earth, agglutinated with silk, and were about four-fifths of an inch in length, and of a brownish color.

The moth measured an inch and three-tenths across the expanded wings; the upper pair were of a brownish color, marked on the margin with an irregular band of dirty cream-color, marked with black spots on the extreme outer edge. In the centre of each wing was an oblique line of the same color; the body was brown; the under-wings of a dirty, yellowish-white, with a dark shade near where they touch the upper-wings; the antennæ were threadlike.

The eggs producing these worms were found deposited in clusters in September, and not singly, like those of the boll-worm. The old caterpillars are subject to a disease which often proves fatal; and hence it is difficult to raise them in confinement. When attacked, they appear to bloat or swell very much, become full of a watery pulp, suddenly cease to feed, and soon perish, when the outer skin turns black, and the inside is found to be full of a liquid, putrid matter. Perhaps, if they were not subject to this disease, these cater-

pillars might do as much damage to the cotton as the boll-worm; but, being generally not very numerous, they cannot do much injury.

The same remedies will do for these worms, or caterpillars, that have been recommended for the boll-worm.

THE STRIPED PALE-GREEN CATERPILLAR.

There was another caterpillar (Pl. IX. fig. 6) found feeding upon the leaves of the cotton-plant, near Columbus, in Georgia, which sometimes buried itself in the bolls, in the same manner as the boll-worm. It was about an inch and a half in length, of a pale-green color, with wavy, longitudinal stripes of a lighter color on the back, and with a longitudinal black line running down each side, thicker and darker on the fore part of the head. Under this was a broader line, nearly white, tinged with light-red or reddish-brown. On each side of every segment was a small black spot. It had six pectoral, eight ventral, and two anal feet.

Most of these caterpillars were found about the 20th of October, but, unfortunately, died before completing their final change. They were not numerous on the plantations, and therefore could do but little damage.

THE RED-BUG, OR COTTON-STAINER.

(*Lygœus ?*)

This destructive insect is found by millions in East Florida, on the cotton plantations, where it does immense damage by staining the fibre of the cotton in the bolls, and rendering it unfit for use where pure-white fabrics are required. The specimens figured (Pl. IX. fig. 7) were found near Jacksonville, in October, on the open bolls, under the dried calyx, and congregating together on the dead leaves under the plants, or on rotten logs, or decayed wood. Several of the open bolls were actually red with these insects, exhibiting every stage of growth, from the larva to the perfect bug, all clustered together in such masses as almost to hide the white of the cotton itself. The beak, or rostrum, is four-jointed, with the end blackish, and, when not in use, is re-curved under the thorax, which is somewhat triangular in shape, with the anterior part red; a narrow, distinct band of whitish-yellow divides the thorax from the head; the posterior part is black, edged between the thorax and wing-cases with whitish-yellow; the scutellum is triangular, red, and edged with a distinct line of whitish-yellow on each side, and partly down the centre of the wing-case; the elytræ, or wing-cases, are flat, brownish-black, and containing two distinct x-shaped whitish-yellow lines on them, intersecting each other near the centre; the wing-cases are also edged with a distinct yellowish-line, as far as the x. The body is flattened, and, in the female, projects on each side beyond the wing-cases, showing the bright-red of the abdomen, and contrasting with the dark color of the wing-cases. The under-wings, are hidden under the upper wing-cases, and are transparent, veined, and of a yellowish color, clouded

with black. The thighs of the fore-legs are somewhat spiny near the tibiæ, and of a red color. The tibiæ and tarsi are black; the under part of the body is bright-red, with rings of yellowish-white running around it, on the edge of each segment.

The female produces about one hundred eggs; the young larva is completely red, almost scarlet, with distinct whitish-yellow bands around the body, on the edge of each segment. The thighs are red, with the tibiæ, tarsi, and antennæ blackish.

The pupa differs only in size, and in having the unformed wing-cases very small and black, contrasting strongly with the vivid red of the body.

The perfect male is about three-fifths of an inch in length, and the female about seven-tenths of an inch, from the head to the end of the abdomen. They are similar in shape and color, differing only in size. The head and eyes are red, the antennæ black, with four long joints.

The following communication on the subject of this insect was received from Mr. B. Hopkins, of Jacksonville, a practical Sea-Island planter, of nearly thirty years experience:—

"The 'red-bugs,' or, as they are sometimes properly denominated, the 'cotton-stainers,' generally make their appearance about August, or late in July, which is near the usual season for cotton to begin to open. They can readily be distinguished from other bugs, harmless in their nature, by their being of a red color, and more sluggish in their movements. The nearer the fruit advances towards maturity, the more injury they do to the cotton. The pod, or boll, is perforated by this bug. Whether the staining matter is imparted to the fibre of the cotton during the perforation directly, or by a slow process diffusing itself with the sap abounding at that time in the pod, is not yet ascertained. I am of the latter opinion, from the fact that almost the entire product of the boll is discolored when it opens, which does not seem at all to cause a premature development. As winter approaches, they gradually retire, and take refuge among the logs, or burrow into the soil at the root of the cotton-plant, where they hybernate. After a wet season, in winter, they may be found in hundreds on the sunny side of the stalks, enjoying the genial atmosphere, until towards evening, when they again retire. They can be kept down very easily, when there are not more than five acres planted to the hand.

"I have been in the habit of offering a reward every night to the negro that brings in the greatest quantity, each of whom is furnished with a pint bottle suspended across the shoulders, into which, as they pass along picking the cotton, they deposit all they can discover. In many instances, I have seen the bottle filled by one negro in a day. They may also be greatly reduced, by destroying them when they come out in winter, in their half-torpid state; a torch of fire in that case is best. They may be buried a foot under ground, and most of them will still escape from their inhumation. If there should be stumps or trees in the fields, they should be burned, and that will generally reduce the quantity for a year or more. In fact, when they receive timely and proper attention, they need not be dreaded.

"No process that I know of can extract the stain produced in the

bolls; it is indelible, and considerably reduces the price of the cotton in the market. These insects have been much on the increase for the last ten years, which I attribute to the excess in planting, as well as the want of proper efforts for their destruction."

It has been stated by other planters, that the fœces of the insect produces the reddish or greenish stain, and that the red-bugs will collect where there are splinters or fragments of sugar-cane. Advantage has already been taken of this habit to collect them by means of small chips of sugar-cane, when they may be destroyed by boiling water; and as they also collect around piles of cotton-seed, they may thus be easily decoyed, and then killed, either by fire or hot water, when congregated. All stumps and dead trees standing in the field should be well burnt out. The experiment of destroying them by means of the crushed sugar-cane and poison, has been tried; but, as no report of the experiment has been received, it remains doubtful whether it can be recommended or not.

INSECTS FOUND IN THE COTTON-FIELDS—NOT INJURIOUS TO THE CROP.

(*Zanthidia niceppe.*)

There are many other insects found in cotton-fields, which are perfectly harmless to the plant, although the larvæ of many of them subsist upon the weeds which grow between the rows or around the edges of the plantation.

Among these insects, we find butterflies, in general, one species of which is frequently seen hanging over the ground by hundreds, around moist and damp places. The caterpillar of this fly (Pl. IX. fig. 8) is of a deep-green, velvety appearance, with a yellowish longitudinal line running down each side. It was found upon the *Cassia marylandica*, and measured an inch and one-fifth in length. The chrysalis is greenish, with a very pointed head, and fastened to the branch or leaf by the tail, and by a thread fastened at each side and passed over its back.

This butterfly is about an inch and four-fifths across the expanded wings, which are of an orange-color, with a broad, black border around the edges.

THE ARGYNNIS COLUMBINA.

The caterpillar of another butterfly (Pl. IX. fig. 9) is often found on cotton-plants, where it has wandered from its natural food, which consists of the wild passion-flower, so often found growing as a weed amongst the crops. It is about an inch and two-fifths in length, of a bright-chesnut color, with two longitudinal black stripes along the sides, and a broken line of yellowish-white inside of each black stripe; it has also two long, projecting, black horns, or protuberances,

on the first segment of the body. When about to change, it selects a place under a leaf, branch, or fence, where it spins a small spot of silk, to which it suspends itself by its hind-legs; the skin of the fore part of the body then splits open, and the chrysalis makes its appearance, also hanging suspended by means of several small hooks, with which the end of the tail is furnished, and which, during the disengagement of the skin, becomes entangled in the silk.

The chrysalis is about seven-tenths of an inch in length, of a pale, whitish-green, containing black marks and brilliant metallic, golden spots. These chrysalides, however, together with those of the great American frittellary butterfly, are often destroyed by the larvæ of a small fly.

The butterfly makes its appearance in summer in a few days, and measures from two inches and a half to three inches across the expanded wings. It is of a bright chesnut-brown, barred and spotted with black.

GREAT AMERICAN FRITTELLARY

(*Agraulis vanillæ.*)

The caterpillar (Pl. IX. fig. 10) of this butterfly is of a light chestnut-brown color, with a dark, longitudinal stripe down each side, and is shaded with black below the spiracles. It measures about an inch and a half in length, and is covered with sharp, thorny spines; two spines are also found upon the top of its somewhat square-shaped head.

The chrysalis, which is shaded with brown and drab, is about an inch and a tenth in length, and hangs suspended by the tail from trees, shrubs, and fences.

The butterfly measures from two inches and three-fourths to three inches and a fourth across the wings; the upper sides of which are of a bright rich chesnut-brown, spotted and marked on the veins with black. The under-side is beautifully marked with large, metallic, silver spots.

ANTS.

Whenever the plants are infested with cotton-lice, (aphides,) myriads of small ants may be seen running hurriedly up and down the stems and leaves, or leisurely moving amongst the lice, quietly tapping first one and then another with their antennæ, or feelers, and occasionally making a dead halt where they find a sufficiency of this insect food. Many planters suppose that these ants are the parents of the lice; others again suspect them of destroying the aphis; neither of which, however, is the case, as the ants merely visit the colonies of lice to devour the sweet, gummy substance that exudes from the tubercles on the bodies of the aphides, and which is commonly called "honey-dew," from the erroneous impression that it is formed in the atmosphere, and then deposited in the form of dew upon the upper surface of leaves. This honey-dew, however, is a sweet liquid, ejected from the anal tubercles of the cotton-louse, and elaborated in its own body, from the sap which had previously been

extracted from leaves or young shoots, and which, if not immediately devoured by the ants, is ejected by the plant-louse, and falls in drops upon the upper portions of the leaves that are beneath, making them appear as if varnished, or, if old, causing the places thus defiled to be black and rusty, as if affected with a black mildew, or rust.

The ants feed voraciously upon this honey-dew, when fresh, and cause the aphides to eject the substance at will, by merely tapping their abdomens with their antennæ; the drop ejected is immediately devoured by the ants, and other aphides are visited and subjected to the same treatment, until the appetites of the ants are satisfied, when they either loiter about the leaves or descend to their nests in the ground. Ants are of utility in devouring any weak or disabled insects they may encounter in their path, or in consuming any animal substances which might otherwise contaminate the air.

Ants are generally divided into "males," "females," and "neuters." The males and females, at one stage of their growth, are furnished with wings, which the female gnaws or casts off when about to form a colony. The neuters afterwards form the general mass. There are several varieties of the ant found in the cotton-fields, of very different habits and appearance. The most numerous make a hole in the earth, and form a sort of hillock around it, of the grains of earth or sand brought up from below the surface of the ground, and from this nest they make excursions in every direction in search of food.

There is also another species: "red ants," so called, but in reality belonging to the family mutillidæ. They are found singly upon the ground in plantations, and sometimes measure half an inch in length. Their color is a vivid, velvety-red and black. They are able to inflict painful and severe wounds with a long sting with which they are provided. There are also three or four species of small ants, exceedingly troublesome in some of the Southern houses, where they find their way into pantries, closets, boxes or trunks, however closed, and devour any eatable article which may fall in their way. The only means of preventing the ravages of these insects is to isolate the article to be preserved in a vessel of water, or to put all four of the legs of the table, on which the articles may be placed, into vessels filled with water.

The smaller ants, however, have a formidable enemy, the ant-lion, which, in the larva state, forms a funnel-shaped hole in the sand, near the ants' nests, in the bottom of which it lies concealed, all except its jaws, and waits with patience in this den for any ant that may chance to pass along the treacherous path. The ant, suspecting no harm, reaches the edge of the pit-fall, and, the loose sand giving way, it is precipitated to the bottom, where the larva of the ant-lion immediately seizes it with its jaws, and, after sucking out its juice, casts the empty skin away. Should the unfortunate ant, however, elude the first assault of the ant-lion, and endeavor to escape by climbing up the steep sides of the funnel-shaped hole, the ant-lion throws repeated showers of sand with such precision upon the unfortunate victim that it very seldom fails to overwhelm and bring it within reach of its jaws, when it is seized and its juices extracted as above described.

The perfect insect of the ant-lion much resembles the dragon-fly in form and general appearance; it is also furnished with four veined wings, by means of which it is enabled to transport itself from place to place. The antennæ, however, are much longer, and the larvæ of the dragon-fly are decidedly aquatic, instead of living upon the land, like those of the ant-lion.

INSECTS BENEFICIAL TO COTTON

SPIDERS.

Spiders, in cotton or grain-fields, are decidedly beneficial, inasmuch as they wage perpetual war against other insects, and are incessantly on the watch to catch and destroy all which, in their erratic flights, happen to become entangled in their webs.

One spider makes a very singular nest for her young, of fine silk, webbed up and closely woven together in the shape of a basket with a round bottom, and most generally placed on or near the top of the cotton-plant. This basket is furnished with a cover fitting closely to the top, and is filled with eggs. When the young spiders are hatched, they creep from under this cover, and eventually disperse over the web, which is comparatively large and strong, and stretched from plant to plant. The old female spider appears to brood over this nest, displaying much maternal solicitude for the safety of her infant progeny; for, if forced away, she immediately returns, and will suffer herself almost to be torn limb from limb, rather than desert her precious charge.

The habits of the different species of spiders are very dissimilar; for, while some are almost entirely stationary all their life-time, others are continually moving about, roaming from leaf to leaf, and living entirely by hunting. Many spin their nets from plant to plant, to entrap unwary insects, and generally stay quietly at home in comfortable webs, securely sheltered from the sun and rain, under or between the leaves, waiting patiently for every stray moth that is so unfortunate as to fly into their nets. With the fore-feet carefully placed on a line leading to the radiating net-work, in order to feel the tremulous motion imparted to it by the unavailing efforts of any captive insect to escape, the ant remains perfectly motionless until some straggling fly happens to become entangled, when it immediately rushes down the central line, and, after tying the limbs of its unfortunate victim with a loose web of silk, in order to arrest its struggles for life, deliberately gives it the death-wound, drags the carcass to its den, and devours it at leisure. Other spiders hunt for and capture their insect prey in a manner similar to that practised by the cat. One of them at first approaches an unconscious victim so gently as not to awaken its suspicion, at the same time taking advantage of every inequality of stem or leaf, in order to conceal itself, until within springing distance, and then, jumping suddenly upon its back, killing it with its powerful hooked fangs. It then sucks out

the whole of its juices, leaving only the empty skin, to be blown away by the wind.

Another description of a small spider, about the tenth of an inch in length, of a light-drab color, with two or more dark spots on its back, was found very numerous inside of the involucre, or ruffle, of the cotton-bloom, bud, and boll, where it is said to be useful to the planter in destroying very young boll-worms. In many cases, where the eggs of the boll-worm moth had been deposited and hatched out, and the young worms had eaten through the outer calyx, and already partially pierced a hole in the young bud, or boll, it was frequently observed that no worm could be discovered inside; but upon opening such a ruffle, this small spider was almost invariably found snugly ensconced in its web; hence it was surmised that the young worm had entered between the ruffle and the boll, or bud, and had been destroyed by the spider, the nest of which was found in such situations.

As all spiders are in the habit of destroying small, noxious insects, they may be regarded as beneficial, especially when the crops are preyed upon by the larvæ of very small flies, such as the wheat midge, the Hessian-fly, and many others. These insects, being constantly on the wing, flying about from plant to plant, to deposit their eggs, are very apt to become entangled in the webs, and to be there destroyed.

The spider itself, however, has enemies, one of which is the "mud-wasp," so called. This insect builds cells of clay in out-houses, and under beams, or in other sheltered places. Their nests resemble small pieces of mud thrown up against a roof or wall, when wet, and afterwards dried by exposure to the air.

THE CAROLINA TIGER-BEETLE.

(*Megacephela carolina.*)

This beetle (Pl. X. fig. 1) belongs to the family, cicindeladæ, otherwise called "tiger-beetles," from their savage propensities, and the beautiful spots and stripes with which their metallic wing-cases are adorned. These beetles are always hunting about the ground in search of insect food. A smaller and darker species especially delights in the glare and heat of the mid-day sun; and, when disturbed, flies only a short distance, alighting with its head directed towards the object which has excited its alarm.

The larvæ of the tiger-beetle inhabits cylindrical holes in the earth, and, in these burrows, they wait patiently for any passing insect that may be crawling about on the ground, which, when within reach, is seized, dragged to the bottom of its subterranean den, and there devoured at leisure. They are of a dirty-yellowish-white, and are furnished with two hooks on the back. In the Southern States, they are often taken by the boys, by means of a piece of grass or straw, which being inserted into their dens, is seized by the insect in its crooked jaws, and held with such tenacity that it will not let go until, by means of a sudden jerk, it is brought to the surface of the ground and secured.

The Carolina tiger-beetle is about seven-tenths of an inch in length, of a most beautiful metallic blue, violet, and green; and, when placed in certain positions, it assumes the lustre of bronze or gold. It may also be known by a yellowish curved spot on the extremity of each wing-case. It appears not to be so partial to the light of the sun as some other species, but often conceals itself under stones. It is also seen much more frequently in the cotton-fields during cloudy weather, or toward evening, than in a fervid mid-day sun.

THE PREDATORY BEETLE.

(*Harpalus?*)

A beetle (Pl. X. fig. 2,) belonging to the genus harpalus, is very beneficial to the cotton-planter, inasmuch as its food consists principally of other insects, and of dead putrescent substances. Numbers of them may be seen running about the surface of the ground in search of food, and when disturbed, hide themselves under grass, roots, or stones. The formation of their jaws is peculiarly adapted to a predatory life. As they are very strong, and hooked at the extremity, they are enabled to seize and hold fast any soft-bodied insect, which they generally kill and devour.

It should here be mentioned, however, that the larvæ of an insect of this species has been accused in Europe of feeding upon the pith and stems of grasses and succulent roots, but at the same time it is stated to feed also upon the larvæ of other insects.

Another very similar insect, (*Zabrus gibbus,*) both in the larva and pupa state, is said to be injurious to wheat in Europe; and although the two last mentioned may be injurious to vegetation, yet, as a general rule, the carabidæ are carniverous, and destroy multitudes of insects, in the larva, pupa, and perfect state.

THE DEVIL'S COACH-HORSE.

(*Reduvius novenarius.*)

This insect abounds (Pl. X. fig. 3) in the city of Washington, during the summer and autumnal months, and is very useful in destroying the disgusting caterpillars which swarm on the shade-trees. The eggs are deposited in autumn upon branches, and are hatched in May or June. When young, the insects have abdomens of a bright-red color, with some dark or black spots on their backs. The head and thorax are black. When they shed their skins, they are greyish in color, and display only the rudiments of wings. It is only in the last stage that they acquire perfect wings, when they are capable of flying with great vigor.

The perfect insect measures about an inch and a quarter in length. It destroys multitudes of noxious insects, in every stage of their growth, and is therefore highly beneficial; but, at the same time, it is dangerous to man, if handled incautiously, as the punctures made by its piercer are often followed by severe consequences. When about to attack another insect, it advances towards its prey with a

most cautious and stealthy gait, lifting up and putting down its feet apparently in the same careful manner as a pointer when approaching his game. When near enough to make the fatal dart, it plunges its piercer into the unfortunate caterpillar, and deliberately sucks out its juices. A small specimen experimented with, was placed in a box with ten caterpillars, all of which it destroyed in the space of five hours.

THE ICHNEUMON FLY.

(Ichneumon?)

An ichneumon-fly (Pl. X. fig. 4) was found in the cotton-fields near Columbus, in Georgia, busily employed in search of some caterpillar in the body of which to deposit its eggs, as is generally the habit of this class of flies. The eggs being hatched within the caterpillar, the larvæ devour the fatty substance, carefully avoiding all the vital parts, until they are fully grown, when the caterpillar, having in the mean time changed into a chrysalis, with the devouring larvæ in its interior, the life of its unresisting victim is destroyed, and the grubs change into pupæ, and eventually emerge from the chrysalis skin, perfect ichneumon-flies, to deposit their eggs in other caterpillars.

These insects are generally seen running about plants infested with caterpillars or worms, continually jerking their wings, and anxiously searching in every cranny and crevice in quest of a subject, in which to form the nest and provide food for their young.

The circumstance of this fly's coming from the skin, or case of the moth, or butterfly, is the cause of the mistakes so often made by persons not well versed in natural history; for, when a caterpillar is confined in a glass, and after the change to a chrysalis has taken place, when the real moth is expected to come out, and this fly makes its appearance, the young naturalist concludes, of course, that the fly is produced by the caterpillar; whereas, the rightful tenant of the chrysalis-case had been previously displaced and devoured by the larva of the ichneumon-fly, which was produced from an egg placed by the parent fly in the body of the caterpillar. This fact is here noticed in consequence of some drawings of insects injurious to cotton, having been sent to the Patent Office, among which an ichneumon-fly was figured as proceeding from the chrysalis of a caterpillar. This was correct, inasmuch as it was the parasite which had devoured the chrysalis, but not true, when intended to represent the perfect insect as naturally proceeding from the caterpillar itself.

Some chrysalides of the cotton-caterpillar, which had been preserved during the autumn of 1855, as an experiment to try whether they would live until the following spring, having been hatched out prematurely by the heat of the room in which they were kept, two ichneumon-flies were produced of a slender shape, and about half an inch in length; the abdomen, or body, of the female, was black, and marked with seven light-colored, yellowish, narrow rings around it; the head was black; with the eyes brown, the antennæ long, jointed.

and nearly black; on the head were three ocelli; the thorax was black; the wings transparent, of a rather yellowish tinge, veined with black, and having a distinct black mark on the outer margin of the upper pair; the first joint of the hind-leg was comparatively large, thick, and of a brownish color; the thighs were also brown; the tibiæ, black, with a broad white band in the middle; the tarsi were white, tipped with black; and the ovipositor protruded more than the tenth of an inch. The male presented much the same appearance as the female, but was more slender in form.

THE SMALLER ICHNEUMON-FLY.

(*Ichneumon?*)

The ichneumon-fly, which destroys the aphis, or louse, so very injurious to the cotton-plant, is a minute insect, not quite the twentieth of an inch in length. The head and thorax are black, and the legs and abdomen of a yellowish color. Although so extremely small as to be unobserved, it is constantly engaged in exterminating the cotton-lice, myriads of which it destroys by preying upon their vitals. The female fly lays a single egg in the body of each louse, which, when hatched, becomes a grub. This grub devours the interior substance of the aphis, leaving only the grey and bloated skin clinging to the leaf. This skin serves the young larva for a shelter, where it remains until it changes into the perfect fly, when it emerges from a hole gnawed through the back, and issues forth furnished with four transparent wings, to recommence the beneficial labor of depositing more eggs in the surrounding colonies of lice on the neighboring plants.

The number of lice destroyed in this way can be more fully appreciated by observing the multitude of empty grey and bloated skins, more or less scattered over the cotton-plants infested, each skin having a hole in the back through which the perfect fly has escaped.

THE SYRPHUS.

The larvæ of this syrphus (Pl. X. fig. 5) are found wherever aphides, or plant-lice, abound, and present the appearance of small, yellowish-white naked maggots, or grubs, of about a fifth of an inch in length. Their color is brown, with six distinct yellow spots on the first three segments of the body, and the sides are also marked on the margin with yellow; the body is somewhat hairy. The head is armed with powerful jaws, and gradually tapers to a point, while the tail terminates abruptly as if cut off.

The parent fly deposits her eggs amongst the lice, in order to insure an adequate supply of food to each grub. These eggs are soon hatched by the heat of the sun, and the young grub immediately commences crawling about the leaf; and, being blind, incessantly gropes and feels around on either side in search of cotton or plant-lice, its natural food, one of which, being found by the touch, is instantly seized, elevated above the surface of the leaf on which it

is quietly feeding, in order to prevent the struggling victim from using its feet, or clinging to the leaf when endeavoring to escape from its voracious destroyer. After piercing the living insect, the grub leisurely sucks out the juices, throws away the empty skin, and recommences feeling about in search of another, which, when found, is treated in the same way. When ready to change, the syrphus maggot fastens itself to a leaf or stalk, by means of a glutinous secretion from its own body, and, the outer skin contracting into a pear-shaped case, soon hardens by exposure to the air, and the pupa is formed inside.

After a few days, during the heat of summer, the perfect fly emerges from a hole, at the blunt end of the case, to lay eggs amongst the colonies of lice on the neighboring plants. The perfect fly is about seven-tenths of an inch across the wings, which are two in number, and transparent. The body is generally more or less banded with brown, or black and yellow, and appears like that of a diminutive wasp. This fly has a peculiar habit of hovering on the wing, apparently without motion or exertion, during the heat of the day, near or over flowers, and when disturbed it darts away with great swiftness; but, if the object that alarmed it is removed, it immediately resumes the same attitude and spot, only darting off every now and then to chase some other intruding fly from its own peculiar domain, over which it appears to imagine it possesses absolute sway.

These insects are of essential aid to the farmers and planters, as their larvæ materially diminish the numbers of lice which infest vegetation.

THE LADY-BIRD.

(Coccinella?)

The lady-bird (Pl. X. fig. 6) is a most valuable auxiliary to the cotton-planter, as it destroys the cotton-louse, or aphis, by thousands, and is most plentiful where they abound, always being busy at the work of destroying them; and, as such, I consider it one of the most beneficial of insects to the planter.

The larva is a small, bluish-black, alligator-looking insect, of about the fourth of an inch in length, spotted with a few orange marks on the sides and back. Whenever one of them is seen among a colony of the aphides, the planter may safely calculate that in a few days the number of the lice will be greatly diminished. The larva, when hungry, seizes an aphis, and immediately commences eating him alive. This savory repast being finished, it eagerly hunts about until it has secured another victim, and thus completely destroys all the others upon the leaf. When about to change into the pupa, it fastens itself by the tail to a leaf; the skin of the back splitting open, a small hump-backed, black and orange-colored pupa makes its appearance, which, although furnished with the rudiments of wings and legs, is incapable of locomotion or feeding, but remains adhering to the leaf, with the dried-up skin of the larva still sticking to the end of the pupa. After remaining in this state for a few days, this skin

again splits, and the perfect lady-bird emerges, furnished at first with soft wings, but which afterwards harden, and serve to transport it to the distant colonies of cotton-lice, in the midst of which the eggs are again deposited, to form new broods for the destruction of the planters' greatest pest. The perfect lady-bird also devours aphides, but not in such numbers as their larvæ, in which state it also destroys the chrysalis of the butterfly, (*Argynnis columbina,*) seen so often in the cotton-fields. I have repeatedly observed them in Georgia killing the chrysalides of this butterfly, which hung suspended from the fence-rails, and on the under side of the boughs of trees and shrubs. It appears to attack the chrysalis chiefly when soft, and just emerged from the caterpillar-skin. It is in this state that these wandering larvæ attack it, and, biting a hole in the skin, feed greedily upon the green juice which exudes from the wound. Sometimes, however, it becomes a victim to its own rapacity; for the juice of the chrysalis, drying up by the heat of the sun, quickly forms an adhesive substance, in which the larva is caught, and thus detained until it perishes. Indeed, so very voracious are these larvæ, that they will even devour the defenceless pupæ of their own species, when found adhering to fences or walls.

Many planters imagine that these lady-birds are in some mysterious manner connected with the appearance of the cotton-louse, or even that they are the progenitors of the aphis itself. This erroneous impression is formed in consequence of these insects being always found in similar situations at the same time, and abounding on plants already weakened by the attacks of the cotton-louse. Their sudden disappearance is also accounted for, as, with the decrease of their natural food, the lady-birds also disappear and migrate to neighboring plantations, in search of a fresh supply of nutriment. I have actually known several planters who have caused them to be destroyed by their field hands, when and wherever found, and who complained that their plants were still destroyed by the aphis, or cotton-louse. This was only to be expected, as they had destroyed the natural enemy of the louse, and suffered the pests themselves to breed in peace and safety. I have seen the larvæ of the lady-bird as late as the 18th of November, in Georgia, still busy exterminating the aphis. The yellow, oleaginous fluid, which is emitted by this insect when handled, has a powerful and disagreeable odor, and is mentioned by Westwood, in his "Modern Classification of Insects," as having been recommended as a specific for the tooth-ache.

It may be remarked, however, that there is a much larger species of this insect which does considerable damage to the leaves of cucumbers, melons, squashes, &c., as both larvæ and perfect insects devour the leaves and eat holes in them, so as sometimes totally to disfigure and destroy the plants.

The perfect insect measures nearly half an inch in length, and is of a yellow color, with twelve large and small black spots on the wing-cases, and four small black spots on the thorax; it can be very easily distinguished, however, from its beneficial congener, both by size and color, the useful lady-bird being only about the sixth or the seventh of an inch in length, and of a bright-red, or almost scarlet

color, with black spots, while the injurious insect is much larger, measuring nearly half an inch in length, and being of a light-yellow color, spotted with black.

THE LACE-WING FLY.

(*Hemerobius?*)

The larva of the lace-wing fly (Pl. X. fig. 7) is furnished with two long and sharp jaws, by means of which it seizes the cotton-louse, and in a few minutes sucks out the juices, leaving merely the white, dried skins, to show where it once commits its ravages. The eggs are very singularly placed at the end of a thread-like filament, fastened to the under side of the leaf, and are generally deposited near a colony of lice, in clusters of a dozen or more together, causing them to appear to the casual observer like a bunch of fungi. The eggs being hatched in the midst of the cotton-lice, the young larvæ commence their work of extermination, seizing the younger lice in their jaws, and holding them in the air, and in despite of their struggles, sucking out the juices, and finally throwing away the empty skins.

The larvæ of this insect are not quite a fifth of an inch in length, and are furnished with a sort of apparatus at the extremity of their tails by means of which they are capable of adhering to a leaf, even when all their feet are detached, thus being guarded against accidental falls during high winds, that might otherwise destroy them. When ready to change, a thread is spun from the tail, and, often forming a rough sort of cob-web, the insect spins a semi-transparent, ovoid cocoon, from which it emerges as a beautiful, bright-green fly, with two brilliant eyes, which sparkle like gold, and four transparent wings, of a greenish cast, delicately veined, and netted with nerves resembling the most beautiful lace-work; and hence the common name. This splendid insect, however, emits a most nauseous and fetid odor when held in the hand.

INSECTS INJURIOUS AND BENEFICIAL TO THE ORANGE-TREE.

THE ORANGE-SCALE.

(*Coccus?*)

The insect which has been so destructive to the once flourishing orange-groves of Florida presents the appearance of a minute, narrow, elongated scale, (Pl. X. fig. 8,) with a narrow, semi-transparent, whitish margin. That of the female resembles one of the valves of a long muscle-shell, in shape, and adheres closely to the leaf or branch on which it is fixed, and is apparently formed by successive semi-circular layers added from time to time. When fully grown, it measures about the tenth of an inch in length, by about the fortieth part of an inch in breadth, at the broadest part.

The young insects are produced from eggs deposited by the female under the broader end of the outer case, or shell; and, when first hatched, are furnished with six legs, by means of which they escape from under the maternal shelter, which is somewhat elevated from the leaf, at the hinder part, to allow the egress of the young, which are extremely small, and appear in numbers, like minute, yellowish specks upon the leaf; but, if magnified, the six legs, two antennæ, and two short bristles, at the end of the abdomen, can be plainly distinguished. The body is of a pale-yellowish color, and divided into segments.

When tired of rambling, and having arrived at a suitable place for feeding, the cocci fix themselves to the leaf, or branch, for life. A light-colored, semi-transparent film, or case, with two projecting points at the narrow end, is soon formed over the young insect, and under this thin scale, it may at first be plainly perceived. The scale gradually increases in size, and becomes more opaque and brown, until the shell of the female attains its full growth, at which time it measures about the tenth of an inch in length. If the large scales are taken from the leaf, the female larva, or worm, may be seen in the concavity of the scale, in the same manner as an oyster or muscle, rather in the concave valve of its shell. This grub is of a yellowish, or sometimes pink color. The case itself, when turned upside down, appears to have a narrow margin of a whitish, or semi-transparent substance, where it had adhered to the leaf; a flat flap, or wing, extends on each side from the head, or narrowest end, at least two-thirds down the shell. This appears also to have adhered to the leaf. A longitudinal opening is left between the two projecting pieces, where the naked body of the grub may be seen. The end, towards the thicker extremity, is often vacant until filled with eggs, which, in color, are yellowish or pink. The head of the grub is placed towards the narrow part of the scale, and a piercer, or thread-like filament, proceeds from the under part of the breast, by means of which it sucks the juices from the plant. If the scale is gently removed from the leaf, it will often be found to hang to it by means of this thread-like piercer.

When the female commences to lay her eggs, under the shelter of the scale, they appear to be deposited in parallel rows on each side; but it is difficult to ascertain their number correctly. As many as twenty or thirty, however, have been counted in one female scale. The female decreases in size in proportion to the number of eggs laid, and finally, after having deposited all under the scale, she dies and dries away in the smaller end, with the case still adhering to the leaf. The scale of the male is much smaller than that of the female. The grub inside, after changing into a pupa, of a yellow color, with rudiments of wings, legs, and antennæ, eventually emerges from the case a perfect two-winged fly, so extremely minute as to be scarcely perceptible to the naked eye.

The head of the perfect fly is small, rounded, and furnished with two comparatively long, jointed, and somewhat hairy or bristly antennæ; the thorax is very large; it has six short legs, and two large, transparent wings, in which are two nervure. The body is short, in comparison with the thorax, and has a long point, curved down-

wards at the extremity of the abdomen, which is somewhat hairy. It is said of some of the coccus tribe that the males escape backwards from the shell, or case, with the wings extended flatly over the head.

Mr. Browne, in his work on the "Trees of America," states that "this insect first made its appearance in Florida, in Robinson's Grove, at Mandarin, on the St. John's, in 1838, on some trees of the Mandarin orange, which had been procured in New York. In the course of three or four years, they spread to the neighboring plantations, to the distance of ten miles, and were the most rapid in their migrations in the direction of the prevailing winds, which evidently aided them in their movements. In 1840, Mr. P. S. Smith, of St. Augustine, obtained some orange trees from Mandarin, and had them planted in his front yard. From these trees, the insects went to others in the same enclosure, and rapidly extended themselves to the trees and plantations to the northerly and westerly parts of that city and its vicinity, obviously aided in their migration by the south-east trade-winds, which blow there almost daily during summer; and, what is remarkable, these insects were occupied nearly three years in reaching trees in the south-east side of the city, only about half a mile from their original point of attack. They have since, however, extended themselves to all the trees in and about the city, but have not yet travelled in any direction beyond ten miles. Being aided in their dispersion by birds, and other natural causes, impossible to guard against, they must eventually attack most if not all the trees in Florida; for the wild-orange groves suffer equally with those which have been cultivated, and no difference can be perceived in their ravages between old and young trees, nor between vigorous and decayed ones. Various remedies have been tried to arrest their progress, such as fumigating the trees with tobacco-smoke, covering them with soap, lime, potash, sulphur, shellac, glue, and other viscid and tenacious substances, mixed with clay, quick-lime, salt, etc.; but all have failed, partially or entirely, and it appears not to be in the power of man to prevent the ravages of these insignificant and insidious destroyers."

The above remarks were first published in 1846, and at the present time, (1855,) the disease appears to have spread over the greater part of Florida, as was anticipated. Several other remedies have been proposed, one of which was earnestly recommended the past season. This consisted of a wash, composed of a gallon of water, a gallon of whiskey, and four ounces of aloes. Many contradictory reports as to the efficacy of this mixture have been received, some stating that it completely succeeded, while others contend that it was an entire failure, or merely destroying the first brood of insects already on the tree. If the latter should be the case, it might perhaps prove more effectual if the tree were well washed and syringed, every two or three weeks, as long as no perfect eggs remained upon the dried-up skin or shells of the dead female, to produce new generations, as, perhaps, these eggs might not be affected by the wash which was strong enough to destroy the life of the perfect insect. It would also be advisable to syringe the trees from time to time, even when very few insects can

be discovered on the branches or leaves, as the young cocci are so minute as to be almost invisible to the naked eye.

The plan of highly cultivating and enriching the soil has also been much recommended, as promoting a healthy, vigorous growth, and strengthening the constitution of the tree, so that it is better enabled to withstand the attacks of these foes. Grease from fat bacon, rubbed on the trunk and main branches, or the rind or outside thick skin, placed in the fork of the branches, where the fat and salt may run down the main stem, is said by one person to have been of much benefit; but others, who tried this plan, assert that the trees were killed in consequence of the application. In fact, so many different remedies have been recommended, and so many contradictory reports given of the results, that it will not be prudent to place reliance upon any of them, until a regular series of experiments shall have been instituted with the various mixtures, upon trees of the same age and strength, in different soils and localities, and a faithful report given as to the success or failure—bearing always in mind, however, that although the old scale insect may be destroyed, yet millions of eggs may remain unhatched under the sheltering scales, waiting only for a few days' genial sunshine to hatch and spread over the tree, which, perhaps, may have been washed in the meantime by heavy rains, so as not to leave a vestige of the mixture remaining to prevent the young from fixing themselves, *ad libitum*, when they first emerge from the sheltering scale.

Another kind of scale insect (coccus) is also found upon the orange-trees, which measures about the tenth of an inch when fully grown, and is of a much more oval form than that already described. The young cocci were of a yellowish-white color, and had the head and thorax somewhat defined by indentations on the sides, and marks on the scale itself. They are furnished with two antennæ, and had six legs, by means of which they moved about the leaf until they found a place suited to their taste, when they immediately fixed their piercers in a leaf or branch, and became coated with a scale-like covering, which appeared to adhere to the surface of the place where it was fixed; and here they remained motionless the remainder of their lives.

This description applies to the female coccus alone, as the males were not discovered; but doubtless they resemble the species already described, in being provided with wings, as well as in general habits. As the female scale becomes older, it gradually assumes a brownish-black appearance, having a somewhat lighter colored margin. This coccus appears to be peculiarly subject to the attacks of parasitical insects, which serve materially to check its increase. Many of the scales were observed in September to be punctured with small holes in their backs, made no doubt by small parasitical flies, which had devoured the original tenant of the scale. One of the flies which came out of these scales measured about the twentieth of an inch in length; the body and thorax were of a metallic green color;. the eyes black, and the legs of a brownish color; the four wings were transparent, and the antennæ jointed and hairy.

Another hymenopterous fly came out of the dead scales, which also measured about the twentieth part of an inch in length, the thorax and first segment of the body being light-brown, with the rest of the abdomen blackish and hairy; the head was furnished with three ocelli; the four wings were transparent, and the antennæ long, jointed, and hairy. These parasitical flies no doubt do much good in lessening the numbers of this kind of coccus; as, although breeding in similar situations, and with apparently as good a chance to multiply as the others, it was not found to be nearly so numerous as the scale insect first mentioned. This may perhaps be attributed to the attacks of these flies, as hundreds of dried-up scales were seen with large holes in their backs, and the contents eaten out as above described.

While on the subject of the orange-scale insect, it may be as well to mention that some time last year (1855) another coccus was imported into Jacksonville, Florida, on some lemons sent from Bermuda; and, as they may perhaps spread in the vicinity, it would be well to draw attention to the insect, and describe it as far as known. The length of the full-grown female scale is rather more than the twentieth of an inch; it is somewhat pear-shaped, and of a brown color; the grub is of a reddish-yellow, and furnished with a piercer from its breast, like the coccus first described; the young have two antennæ, six legs, and two long hairs, or bristles, at the end of the body. The male scale is not so large as the female, and is formed of a white, cottony or parchment-looking substance, constituting a case, with an elevated and rounded ridge in the centre, in which a reddish pupa was found. The mouth of this case was stopped up with a dark-looking substance, apparently the cast-skin of the larva. The male larva is reddish in color, and measures not more than the fortieth of an inch in length. The perfect fly is also red, and is furnished with two hairy antennæ, six legs, and has the thorax very large. The two wings are transparent, and the end of the body is furnished with a curved, hard projection. As it is very probable that this insect will increase, it would be well to note any progress it may make during the ensuing year, and to use the remedies suggested in the first article on the coccus of the orange.

There are also found on the orange-trees numbers of small mites, which have frequently been mistaken for the young cocci; but they may be very easily distinguished, by their activity from the young scale insects, which crawl about very slowly. The mites have eight hairy legs, somewhat like those of minute spiders, and are mostly of a yellowish color, although some are also found of a delicate pink hue. They are generally seen briskly running among the stationary cocci, and may often be found concealed under the old scales; but, whether they do any harm to the tree, or merely feed upon the dead or dying cocci, has not yet been satisfactorily ascertained.

The pupa of a parasitical fly was found under the scale of one of the cocci; the head, wings, antennæ, and legs were perfectly formed as in the ichneumon-flies; the eyes were comparatively large and brown, and the rest of the body of a whitish-yellow. The perfect fly could not be recognised, however, as the pupa died without changing.

BEES, WAX, AND HONEY.

BEE-CULTURE IN RUSSIA.

The rearing of bees is extensively carried on in the several parts of European Russia, particularly in the central and southern governments, as well as in the Polish and in the trans-Caucasian provinces. This insect acclimatises up to a very high latitude, even in Siberia. It was long thought that the climate of the latter country was utterly unsuitable for the rearing of bees; but experiments made at the commencement of the present century in the governments of Tomsk, Omsk, and Jenisseisk, have proved the contrary. It has greatly suffered, however, in some provinces, from the destruction of the forests; for the bee prefers well wooded districts, where it is protected from the wind. The honey procured from the linden tree (*Tilia europæa*) is only obtained at the little town of Kowno, on the river Niemen, in Lithuania, which is surrounded by an extensive forest of these trees, and where the rearing occupies the principal attention of the inhabitants. The Jews of Poland furnish a close imitation of this honey, by bleaching the common kinds in the open air during frosty weather.

The ceremonies of the Greek church, requiring a large consumption of wax candles, greatly favor this branch of rural economy in Russia, and preserve it from the decline to which it is exposed in other countries, from the increasing use of stearine, oil, gas, and other fluids for illuminating purposes. The peasants produce wax so cheaply that, notwithstanding the consumption of this article has greatly diminished abroad, it still continues to form an important item of the commerce of the country; but the exportation of honey has considerably increased in consequence of the extended use of potato syrup, which has also injured the honey trade in the interior.

The rearing of bees is now almost exclusively dependent on the manufacture of candles for religious ceremonies, and on the consumption of honey during Lent, it being then used instead of sugar, by the strict observers of the fasts. The government encourages this branch of rural industry, as affording to the peasant an extra source of income, and has adopted various measures for the accomplishment of this end. With the view of diffusing the requisite knowledge among the people of the public domains, bee-hives, and a course of practical instruction upon the subject of bee-culture, have been established at several of the crown farms, and pupils are sent every year, at the expense of the government, to the special school in Tschernigow, founded for the purpose, in 1828. After having finished their studies, the pupils, quitting this establishment, may become teachers in the schools dependent on the Ministry of Domains, or carry on the business of teaching on their own account. They enjoy a temporary exemption from military service; and such of them as wish to establish hives for themselves obtain loans for the purpose from the Department of Rural Economy. By way of further encouragement, the

Ministry of Domains has granted permission to the peasants to establish hives in the crown forests, under the precautions necessary to prevent the occurrence of conflagrations.

The total production of wax in Russia is estimated at 5,412,000 pounds per annum; and, as the usual calculation is three pounds of honey to one of wax, this supposes a production of 16,236,000 pounds of honey, the whole being valved at $2,250,000. D. J. B.

CONDENSED CORRESPONDENCE.

Statement of HENRY EDDY, *of North Bridgewater, Plymouth county, Massachusetts.*

I have had much experience in the production of "artificial colonies," and also in what is termed the "non-swarming" system of bees. But I have abandoned both, and am satisfied that the bees know the best time and mode of conducting their colonisation. I do not feed my bees with the expectation of obtaining thereby surplus honey for market; for no one receives back the amount he thus feeds, and what he does receive, is not much changed nor improved. I adopt the natural system of swarming, destroy no bees, but keep them alive and at work; and, if I have any advantage over others, it consists in placing them in circumstances under which full scope is given to their instincts. My profits from bee culture seldom fail from the loss of colonies in winter, or by depredations of the bee-moth at other seasons. By the mode I pursue, certain swarms are made to pay, in the increase of stock and honey, a profit of 100 per cent., while others give from 500 to 600 per cent. The average profit upon my entire stock, for several years, has been 327 per cent. per annum. I accomplish this by the use of a hive of my own construction.

My surplus honey sells readily in market for 25 cents a pound.

IMPROVEMENT OF LAND.

ON THE DRAINAGE OF HAARLEM LAKE, WITH SUGGESTIONS ON ITS APPLICABILITY TO OVERFLOWED LANDS IN THE UNITED STATES.

Thrift and plenty are the ideas we ever associate with the name of the Netherlands. Placed in a situation in which the exercise of industry, perseverance, prudence, and economy is essential to their very existence, the people of the "Low Countries" cheerfully obey the beneficient command to labor; and such are the fruits of their willingness to toil, that the rest of the world behold them with wonder and admiration.

From the middle of Belgium, a few miles north of Brussels, the country north-eastwardly becomes almost entirely a dead level, extending in monotonous sandy and peaty flats through Hanover, Jutland, Holstein, and, with little interruption, through Prussia into Russia. But the lowest part of this immense region, and that which has most recently emerged from the sea, is undoubtedly the country lying between the mouths of the Scheldt and the Ems; within this distance the Rhine, joined by the Meuse, Yssel, and other rivers, enters the sea, through a number of arms, and sluggish winding channels, which by no means represent the magnitude of their main streams as they appear higher up. The delta of the Rhine may be conceived to have been in early ages subject to perpetual changes of form, as new mud-banks were deposited, blocking up the old channels, and leading to the formation of new ones. Besides, it is obvious that the river, in forming a domain of alluvial deposits had to contend with the sea, which washed away the accumulations of mud, or covered them with sand, according to the vicissitudes of the seasons. The soil of the Netherlands shows everywhere the proofs of this struggle between the billows of the ocean and the river floods, in the alternation of salt and fresh water deposits. It also bears evidence to the fact, that these changes, effected by the inundations of the Rhine, or by encroachments of the sea, occurred frequently, long after the country had become inhabited. Remains of forests now lie buried under the waves of the German ocean; paved roads and traces of villages and of cultivation are found beneath the morasses on the banks of the Ems, and many similar proofs exist of great physical changes, respecting which history is silent.

For the purpose of securing the permanence of their territorial possessions, the early occupants of this country had recourse to dikes, or embankments, high and strong enough to protect them under ordinary circumstances from the tides; and, placing wind-mills on these

dikes, exposed to the sea-breeze, they worked the pumps which drained the enclosed lands.

The Netherlands now present to our view an artificially constructed country, some portions of which are many feet below the surface of the sea, and nearly all too low for natural drainage. How this land has been rescued from the floods and waves, and how it is preserved from their attempted inroads, it is the purpose of this paper to explain.

The recovery of land from the water, in Holland, is the most important branch of engineering, insomuch that a Government Board has existed for centuries, the duties of which are confined to the administration of the hydraulic works of the kingdom. This Board is denominated the "Waterstaat," or Board of Marine Engineers; and in matters affecting the protection of the country from the waters of either the rivers or the sea, its powers are very great, if not absolute. A school of instruction in this particular branch has also long been maintained by the government.

"Polder" is a term applied in the Netherlands to a tract of country the surface of which is lower than the waters adjacent to it, and which, therefore, requires to be protected from them. Such tracts are abundant throughout the country here described, exceeding a thousand in Middle Holland alone. They are of various sizes, and of various degrees of depth, some of them indeed being 20 feet below the level of the sea.

These polders are formed in four different ways, namely, first, of ground reclaimed from the sea by the skill of the engineer; second, of ground protected from the rivers by circumscribing, and consequently diverting and deepening their currents; third, by the draining of lakes; fourth, by the digging of turf for fuel, in such quantities as to make extensive depressions of this character. In Rhineland, there is of Nature's formation of dry land (more than one-third of which is "downs," or formations caused by deposits of sand upon the margin of the sea,) but 76,000 acres, while there is of polder land 173,000, and of land still redeemable as polder land, 56,000. But one-fourth of the land of Rhineland, therefore, is above the level of the sea; and a system of drainage adapted to its recovery and preservation, requires, not only the construction of sluices, ditches, canals, and embankments, but a resort to extraordinary mechanical agencies in elevating the water above the surface of the contiguous rivers or seas, in order that it may flow into them. To illustrate the method which experience has proved to be the best for the accomplishment of this object, a single great and successful instance will here be reviewed.

Haarlem Lake, or *Haarlemmer Meer*, (Pl. XI.) was two miles south of the city of Haarlem, in the province of North Holland, a city that has been described as "very well built, very clean, and very dull," yet which is, to all who esteem intelligence, industry, moral worth and integrity, one of the most interesting cities of the world. This lake was formerly an inlet of the Zuyder Zee, (a gulf of the German ocean,) of an irregular, oblong form, 33 miles in circumference, and enclosing an area of about 40,000 acres. It communicated in the north with the river Y, and in the south with the Old Rhine.

Its average depth was a little more than 13 feet below the lowest tides in the Zuyder Zee. The recovery of the land for the purposes of agriculture was not the primary object leading to its reclamation, the danger of its extension and encroachment upon the soft alluvial soil of the surrounding country being constantly regarded as imminent. Indeed, by the overflow of its banks during a hurricane, in November, 1836, the city of Amsterdam, four miles northeast of it, sustained considerable injury; and in the succeeding month, the storm coming from a different quarter, the city of Leyden, four and a half miles southwardly, experienced a like calamity. Thus admonished, the government determined upon the great undertaking it has since so successfully accomplished.

The attention of the people had been directed to this enterprise as early as the year 1617, and, from that period to the year 1839, many projects were submitted to the government for the purpose. Allusion to any of these plans will not be here made, except so far as to do honor to a millwright whose success in reclaiming submerged lands obtained for him the appellation of "Leeghwater," which may be interpreted "Water-drainer." Such was the skill and sagacity of this person, that at that early period he proposed a plan that differed but little from that which was finally adopted, except that he contemplated a reliance upon windmills for the power necessary to elevate the water from the lake.

In 1839, after a series of careful investigations, and various modifications and amendments of the plans previously arranged, the commissioners, destined finally to superintend the work, proceeded to enclose the entire lake, including Spiering Meer, and Kager Meer, the whole comprising an area of 44,520 acres, which was to be drained to a mean depth of about 13⅛ feet, besides the accessions by leakage from the surrounding lands, and the fall of rain during the operation.

The first object to be accomplished was the construction of a dike and canal around the entire area, in order, first, to intercept the water from the adjoining lands on a higher level; second, to provide a navigation in lieu of that previously afforded by the lake; and third, to form a channel, for the flow of the water pumped from the lake into the sea. This canal is some 40 miles long; in its northern portion, it is 147½ feet wide, at the level of the tow-path, which is the level of the datum at Amsterdam; on the west and south, the width at this point is a little over 131 feet; and, on the east, it is a little over 124½ feet wide. Its depth throughout is 9¼ feet. The dike between the canal and the lake is 13⅛ feet on the crown.

The flow of water out of the canal was found not always to be depended upon; as, when the wind was strong and adverse, it was repelled to such a degree as to render further agencies necessary.

From an examination of Pl. XI. it will be seen that the passage of the water from the canal is provided for at three points: first, to the North Sea, or German Ocean, by the great cut and sluices at Katwyk; second, by the sluices at Halfwege, or Halfway, between Amsterdam and Haarlem; third, by the Spaarne, through the sluices at Spaarndam, by both of which outlets the waters are dis-

charged into the arm of the Zuyder Zee, called the Y. At the first-named of these places, the only remedy applied is an arrangement of gates which remain open when the flow of water is outward, but closed when the pressure of the tide is reversed. At the second, the resistance has not proved so frequent nor serious as to require the application of a remedy; but at Spaarndam, where the canal empties into the sea, a steam-engine and machinery adapted to raise a great quantity of water to a limited height, of from a few inches to two and a half feet, have been provided, and are used whenever the wind blows strong from the north or northeast.

The commissioners were in the beginning empowered to borrow 8,000,000 florins, or $3,200,000, to provide for the defence of Amsterdam from inundation; to purchase all lands required; to divide the soil when drained; to supply the new polder with water in time of drought; and to arrange a system of canals, channels, or ditches, roads, and bridges.

The work was commenced by the construction of the dike and canal around the lake. This was not generally difficult, the excavations being through firm peaty soil, impervious to water, which was thrown up to form the body of the dike, a layer of turf being used to finish it off; but, in some situations, it was otherwise, as, for instance, on the narrow neck of land between the lake of Haarlem and the Turf-pit lakes near Aalsmeer, which is of a soft and spongy nature, the surface consisting chiefly of reeds and aquatic plants, and soft peat forming the substratum. This land rose and fell with the water in the lake. Ingenious, yet tedious, laborious and expensive means of overcoming these obstacles had therefore to be resorted to; such as the exposure of layer after layer of the peaty soil to the sun and wind, and sinking them gradually by the weight of additional layers, until the whole mass sank through the soft peat to the solid ground beneath, when some firmer soil from old dikes was added, and the proper form given to the embankments, by the removal of the superfluous portions. At other points, the bases of the embankments were protected by sheet-piling. In crossing canals and creeks, successive layers of fascine, or faggot-work, formed into oblong masses, were floated to their destined positions, and then loaded with sand or gravel until they sank, in layers, crossing each other at right angles. They were then secured in position by stakes driven through them. Over the wall thus formed, earth was thrown to form the slopes of the dike and canal.

Not only was it necessary to construct dikes between the canal and the lake, or polder, but between the canal and the Turf-pit lakes also. For this purpose, fascine, or wicker-work, was resorted to, upon the exterior of which was thrown sand, obtained at great expense. This, mingling with the soft soil, rendered it impervious to water.

So well did this work prosper, that, in 1843, it was regarded as nearly completed; but, in consequence of delays in obtaining the requisite steam-engines and pumps, the lake was not closed until May, 1848.

Pumping a very large quantity of water to an inconsiderable height was a purpose to which no great engine had been previously adapted; and, as this height was to be gradually increased, provision had to be

made for varying the capacity and action of the machines. No extensive pumping apparatus in any part of the world was therefore suited for imitation; but recourse was wisely had to England for the light of experience in the matter, which resulted in the employment of Messrs. Joseph Gibbs and Arthur Dean, of that country, to furnish drawings and specifications, according to which three engines were constructed and applied to the work, one of them being completed and tested, however, before the others were commenced. This first was called the "Leeghwater," in honor of the worthy engineer already named. It was erected near Kaag, which is not far from Leyden. The "Cruquius" and the "Lynden," called after two personages distinguished in the promotion of the great enterprise, were erected, the former near Haarlem, and the latter near Amsterdam. The engine-houses are massive circular towers, and the boiler-houses square buildings attached to their sides. Preparatory to laying in the foundations of these structures, coffer-dams were thrown around their sites. The water having been pumped out, the areas were dug to a depth of about 23 feet below the mean surface of the lake. Piles were then driven to a depth of about 40 feet below that level, and over them a strong platform was laid to receive the walls.

The peculiar engine placed at Spaarndam, to coerce the water from the canal to the sea, is of course additional to the three here spoken of. It is of 360 horse-power, and gives motion to ten water-wheels. Each of the other three engines named has been stated to be of 400 horse-power, and to have cost half a million of florins, or $200,000. During the thirty-nine months consumed in draining the lake, ending on the first of July, 1852, they worked nineteen months and a seventh, and raised 831,839,501 cubic metres of water, equal to about 219,771,996,000 wine gallons. The engines rested during that dry summer, and, in the following winter, the water accumulated upon the moist polder, which would not absorb it, to a considerable height; but this was exhausted by June, 1853, when the sale of the recovered lands was commenced. In the following winter, however, accumulated waters again arose from rains and leakage; but the system of interior canals and ditches being then regarded as perfected, including a basin for the reception of the waters, the work appeared to be nearly completed in the summer of 1854; yet, although the winter had been very remarkable for its copious rains, it was to the general disappointment that the central and lower portion of the great polder was found to have accumulated much water in the winter of 1854–5. There were two causes for this apparent failure: first, the engine boilers were not supplied with filtered water in sufficient quantities, and the earthy deposits impaired their efficiency; and, secondly and chiefly, in the system of interior drainage adopted, too much dependence had been placed upon the efforts of the proprietor of each tract of 20 hectares, or nearly 49½ acres, in draining his own land. In many instances, this was deferred by these individuals; and, in the less favorable situations, the lands had not been taken up at all. The annual amount of rain, a depth of about 27 inches, which had fallen at that period, could neither sink into the

earth nor flow from its surface; neither was the process of evaporation equal to its removal.

In the month of October, 1855, when the writer visited the scene, not only was the work of drainage found to be perfected, but what had been, so short a time before, the bed of a great lake, was then a region of exceedingly fertile land in a fine state of cultivation. (Pl. XII.) It was dry, comfortable and healthy, or the only indications of diseases from local causes appeared to have been among persons whose severe and exposed employments would in almost any locality produce similar effects. Numerous neat, quaint and conveniently-constructed cottages were seen in various directions; a population of about two thousand dwelt within the polder; fields of verdure extended far and wide, enlivened by cattle, horses, and sheep, grazing on the fruitful meadows; and everything the eye could look upon indicated the triumphant achievement of the vast and benificent design, with the exception of some limited patches of soil, charged with vegetable acids and salts of iron, upon which vegetation would not then grow, but which may be restored through the agency of lime.

The cost of the works herein described, and all their accessories, including their preservation and repairs to the end of 1855, and interest on loans made for the general purpose, is stated to have been $3,592,537, but $250,537 more than the original estimate. The number of acres recovered being 44,520; the cost per acre was therefore $80 69.

The engines used in draining the lake will continue to be kept in working order, and will at some seasons be applied daily in expelling the accumulating waters; not that they will all be often required in service at the same time, but because such an emergency is possible; and, should it come but once in ten or twenty years, the motives of economy leading to the setting aside of any of the engines will be regretted. Thus an inconsiderable annual expense must be permanently sustained by the holders of the land in Haarlem Polder, in conjunction with the government.

It is believed that the particularity with which this subject has been treated will not be regretted by the intelligent reader. What can be achieved by patient industry, guided by enlightened judgment, is happily exemplified in this remarkable instance. A small kingdom, with an overflowing population, has thus added to its area many thousands of acres of the richest soil, in the most desired position, providing homes for a numerous agricultural population, productions for the subsistence of many more, and adding to the wealth, strength, and influence of the nation. The two provinces of Holland comprise 2,146 square miles, or 1,983,440 acres. The population of these provinces is 1,106,248. There is, therefore, one person to every acre and a quarter, and, at this ratio, the area of Haarlem lake, rendered cultivable and habitable, is adapted to the maintenance and occupancy of 35,616 people. But when it is remembered that there is of course much waste and inferior land taken into the great aggregate, and that this polder is all equal to the best land of the provinces, its capacity may be stated as equal to the support of 70,000 persons, or twice the number indicated by the general apportionment.

In the United States, land is fortunately to be had at very low prices, and the government has at present no need to resort to such measures as have been here described, either for protection of its domains from the inroads of the sea, or for the acquisition of territory; yet may the example of Holland still be profitable to agriculturists or capitalists in many sections of our country. Land in the far-off West, at only $1 25 per acre, is sometimes, practically, almost as remote and inaccessible to citizens of the United States as to the good people of Amsterdam or Haarlem themselves; and rich alluvial soil, at the very margins of great navigable waters, and near the accustomed homes and markets of our people, is often as desirable to them as to the people of those countries. Immense regions of the most fertile soil ever trodden by man, lying adjacent to the Delta and current of the Mississippi river, through hundreds of miles of its course, as well as extensive salt-marshes along our seaboard, require for their complete restoration nothing more than an imitation, upon a limited scale, of the works herein described. Polders of three miles square, near the levees of the Mississippi, surrounded by canals upon which their products might be conveyed to the river's edge, could be diked and drained at a small cost compared with their subsequent value. It is indeed only in the prairies that land can be tilled without its previous recovery from swamps, or the subjugation of its forests. That the labor expended in the performance of these tasks is greater, in proportion to the value of the lands obtained, than would be required to drain the submerged tracks alluded to, should not be too confidently assumed. That the work may be conducted upon a more limited scale, and consequently with less means, is certain; but capitalists are seldom timid in essaying the most formidable enterprises, when large profits are demonstrated by even the most complicated calculations.

Should an examination of this subject and a series of successful experiments induce their continued prosecution, great public benefits would doubtless also proceed from the narrowing, and consequently the deepening of the courses of rivers upon the margins of which such polders may be established, and from the removal of a great source of miasmatic infection proceeding from organic deposits upon these miry, tracts often so prolific of devastation and disease. D. J. B.

CONDENSED CORRESPONDENCE.

Statement of C. SNIVELY, *of Penn Township, Alleghany county, Pennsylvania.*

Farmers here are turning their attention to draining their wet lands, and they find that nothing they can do will pay better. For instance, a field of 10 acres is sown with wheat, one half of which is so dry that the yield is 25 or 30 bushels to the acre. The other half

being wet, the wheat is winter-killed; weeds take the place of wheat, and the crop does not exceed 5 bushels to the acre, and that of inferior quality. Whereas, if it had been properly drained, it would have produced at least as much as the dry part of the field, and probably more. Would not the increase of crop in one year go far towards paying the expense of draining?

The mode of draining here is to stake off the ditches in such a manner as will carry all the water to the lowest ground, and finally to some stream or ravine. We dig the drains from 2½ to 3 feet deep; then fill up with cobble-stones, which abound on most farms, to within 12 or 15 inches of the surface. We then put a layer of any kind of straw over the stones, and cover and fill up with the excavated clay. The stones should be broken so that no pieces should exceed 2 or 3 pounds in weight.

FERTILISERS.

ON THE PURIFICATION OF CITIES AND TOWNS; THE DEODORISATION OF THEIR FECAL MATTER; AND ITS REMOVAL AND CONVERSION INTO MANURE.

The enrichment of the soil, or its preservation from impoverishment, is the great object of desire in every portion of the world in which man derives his sustenance from the earth; and the means of effecting this object are wisely sought with corresponding earnestness and at vast expense, insomuch that the excrement of birds, under the name of "guano," is brought in large quantities from distant seas, and profitably sold in Europe and in the cities of the Atlantic of this country at 3 cents a pound, or $9 for a quantity sufficient to renovate a single acre of grass land, equaling a sum within a fraction of the price of the land itself. Against the wisdom of enriching the soil, even at this enormous cost, it is not here proposed to urge any objection. The experience of every cultivator will teach him whether he can afford to do so or not; and the question he has to decide, is simply whether the excess of production with the use of guano, when judiciously applied, over the ordinary yield of his land without it, is equal to the cost of this manure. Guano, however, cannot be expected to supersede all other fertilisers, nor even to diminish their consumption. It has not been brought into use with this expectation, but for the gratification of an increased demand—a demand for a powerful quickening agent, of easy transportation, to be applied chiefly in the recuperation of depleted or impoverished soils, for which it is well adapted, but to which it cannot be universally applied, because of the insufficient quantity imported, and the enormous price at which it is sold. It is reasonable, therefore, that

inquiries should be made for other fertilisers adapted to this purpose, and that farmers should ask how it is that Nature has, in this instance, so far deviated from the law that has placed the ore of iron and the coal to be used in its manufacture in close proximity to each other, and in all other particulars manifested the most perfect design of adaptation, and yet requires us to search thousands of miles from the soil we cultivate for the nutriment that is to replace the substances we take from it in the various crops it produces for the sustenance of animals as well as of men. The reply that naturally presents itself to every reflecting mind is, that this cannot be so; and the proof is by no means wanting to sustain this opinion. It may indeed be almost pronounced an axiom, that the best means to restore the soil is by the return to it, in their changed conditions, of those substances by the abstraction of which it has been impaired. There has been no period since the fall of man in which this truth has not been understood, nor in which it has not, in general, been acted upon, by the application of the excrements of animals and decomposed vegetable substances as manure to the soil. But an important omission in this respect has been wilfully made, and it is in consequence of this omission that we are now subjected to the trouble and expense of seeking in other climes for an agent capable of sustaining the soil from which we derive our food. The most nutritious articles of aliment obtained from the soil are consumed by man, and by those animals which form his food. Compared with the highly-condensed aliment that he thus consumes, the hay, straw, grass, and various vegetable substances, eaten by domestic animals, may be regarded almost as nothing; and, when compared with the value of human excreta, the manure obtained from all other sources becomes perfectly insignificant. In the fact that these substances are not returned to the soil for its enrichment, we have perhaps one of the strongest illustrations of the bountifulness of the earth, if not of its exhaustlessness; yet the necessity of the extraordinary efforts, to which allusion has been made, is evidence of the truth that we may not continue to violate with impunity this clearly-indicated law.

Many persons, I am aware, will at first reject these suggestions, or contemplate the subject proposed with aversion; but it will be found that those who, from a want of an acquaintance with the beautiful and purifying economy of nature, are disgusted with the thought of the reproduction of vegetation by means of this particular agency, and are yet reconciled by habit to the use of every other element, however offensive—and all are so—are scarcely known to murmur at breathing constantly, in its volatile effluvia, without the medium of any purifying process, the very substance which shocks their nature to have thus deposited upon the earth in corruption, to be raised in incorruption by an absolute chemical change. What this unworthy prejudice has done, to the injury of agriculture, may be most accurately estimated by an examination of the variety and magnitude of the evils it has inflicted upon the family of man in his home wherever it is found, but especially in the populous cities and towns, where malaria, or bad air, as the word imports, is the imperceptible origin of so many woes.

It has often been pronounced wonderful, that in the most beautiful regions of the earth, where every sense is gratified, and where the air we breathe is even delightfully fragrant, there should be contained within it the most pernicious poisons, under the influence of which man sickens and dies, while in otheir regions, where every object of sight and every inhalation of the air are revoltingly offensive, there is often comparative security. But when it is known that poisons may be taken into the body in the food we eat and in the liquids we drink, and that food and drink containing such poisons may be most pleasant to the taste, it should not be deemed a marvel that Nature has acted in accordance with the same law with respect to another essential element of our nature, and required that we should be guided by reason and experience in making choice of the localities in which our homes are to be placed, in the purification and ventilation of those homes, and in the removal of all noxious influences surrounding or adjacent to them. Though the agency of disease, in either case, may be inappreciable, the origin of that agency is generally susceptible of detection, and often of correction.

But the manner in which impure air injuriously affects the system is not understood by all, though susceptible of the simplest explication. Man, in common with all other warm-blooded animals, requires that the blood in his system should be continually exposed to fresh currents of pure air. So constantly are the lungs required to labor, in the fulfilment of this function, that their cessation even for a few minutes, would result in asphyxia or death. By one action of respiration, that of inspiration, pure air is carried into the system; by another, that of expiration, impure air is carried out of the system. When this function of respiration is performed in a calm and natural manner, there are eighteen respirations every minute, in each of which efforts, about a pint of air is received into and discharged from the lungs of a person of ordinary capacity, and all the blood in the system performs a complete circuit, and is thus exposed to the purifying influence of the atmosphere, once in every two minutes and two-thirds. It is the condition of health and life, therefore, that the atmosphere we breathe should be adapted to this purifying process; or, in other words, that it should be pure. If poisoned, or even contaminated by the effluvia from the decomposition either of animal or vegetable substances, instead of purifying the blood, it must necessarily produce, whether rapid or slow, a progressive deterioration and corruption of the whole mass of the blood, a consequent disorganisation of the solid structures, and the excitement of those violent commotions which constitute fevers, cholera, and other morbid conditions of the human frame. The only just cause of wonder, then, is, that the same amount of accurate knowledge, and the same degree of practical attention, are not given to this element of vitality, that are so uniformly applied to the subjects of food and drink; or, indeed, that the very instinct of our nature, which causes us to turn with disgust from food and drinks of unpleasant odor and taste, is resisted with respect to air, and that we reject the guidance of the wise and salutary admonition of the senses, and persist in breathing an atmos-

phere that the decay of organic matter has corrupted, or that, confined within limited apartments, which has already performed its office of purifying the blood of our systems and measurably lost its capacity for that service.

That this subject may be rendered more certainly comprehensible to every intelligent mind, a few plain facts respecting the blood and its mode of purification will here be stated: The functions of the animal economy cannot be discharged without the preservation of a certain temperature of the body. This temperature varies in different domestic animals, and in different climates, from 96½° to 106° F. In man, it ranges from 96½° to 98⅔°. By the process of respiration, the carbon in the blood is brought into contact with the oxygen in the atmosphere; a species of combustion takes place, and carbonic acid gas, a substance deleterious to life, is thrown off. Whether, therefore, noxious elements in the air, thus brought into contact with the blood, are imparted to it, or the oxygen it contains is insufficient for this process of combustion, in either case, it is manifestly prejudicial to life as well as to health. To illustrate, therefore, the pernicious influences of the very prevalent evil of small or crowded apartments and inadequate ventilation, it may here be stated that the average respiration of a pint of air occurs about eighteen times in a minute, equaling 21⅔ cubic feet per hour, or nearly 520 cubic feet in twenty-four hours. An apartment 14 feet long, 13 feet wide, and 8½ feet high, which are large proportions in ordinary dwellings, would, therefore, not contain air enough to supply three persons during twenty-four hours for the purpose of breathing, without making any allowance for the influence of the insensible perspiration in deteriorating the confined atmosphere, or for the fact that the carbonic acid gas that it contains renders the air exhaled from the lungs heavier than the pure atmosphere; and hence causes it to form chiefly the lower stratum, which, in an apartment of the dimensions given, it would require less than ten hours, (the period during which many persons remain within their chambers,) or an aggregate of 647 cubic feet, to overflow the occupants, whether in a lying or a sitting posture, say at an altitude of 3½ feet from the floor. The elimination of this gas, when produced by the combustion of charcoal, is so rapid that the usual crevices of doors and windows do not perceptibly affect it, and many persons have perished from suffocation in consequence, just as they would have perished from drowning by the opening of a sluice of water into the room, adequate to overflow them in the same time, with the single exception that their senses do not generally admonish them of the presence of the former evil until it has deprived them of the ability to escape. Or, if the pure and unbreathed air, about $\frac{1}{100}$th part of which is carbonic acid, is not kept wholly separate from that which has been surcharged with this life-destroying principle, to that extent is the whole volume of air in a room gradually becoming impaired, as we breathe it over and over; and fortunate is it that it is so, since its sickening effects, so promptly experienced by persons of feeble organisation or ill-health, serve to warn us of the presence of evil before its power has become adequate to prostrate us at once.

It must hence be manifest to every one, that, even where pure dry air prevails, copious ventilation is always essential; and that, in winter, when the combustion of the fuel that warms us is coöperating with our own vital organs in impoverishing the air of its oxygen, and when the desire for warmth within our dwellings tempts us to exclude the atmosphere from without, our danger is always greatest. This, indeed, is often apparent in the prevalence, in the winter season, of such diseases as small-pox, varioloid, measels, scarlet fever, &c., as well as of the catarrhal affections to which we are rendered liable by the debility consequent upon a protracted abstinence from a pure and unimpaired atmosphere.

From what has thus been stated, it is obvious that the preservation of the habitations of the human family from noxious and impure air is one of the first duties each person owes to himself and to his neighbors, and which the municipal authorities owe to those for whom they enact and administer laws; but it will doubtless be as generally acknowledged that this duty is almost everywhere either partially or totally disregarded.

Malaria has been described as of two kinds: The first, or common malaria, is that inappreciable influence which arises from the vicinity of marshes, rivers, or other waters, and overflowed lands, where the decomposition of vegetable substances progresses, often without in the least offending the senses, though the exhalations are of the most deadly character. Ague and fever, billious fever, congestive billious fever, and sometimes typhoid and yellow fevers, are products of this insidious poison, of which, perhaps, the best known phenomenon is the fact that a humid atmosphere is highly conducive, if not essential, to its dissemination. Thus it is that, in most situations, during a rainy season, or in the dewy hours of morning or evening, it is generally known to be received. The chilliness of the air at such times is often supposed to be the origin of disease; and it may be true in many cases, that this has proved the exciting or developing cause of an attack; but that the disease does not originate in this cause is abundantly proved by the fact that no person sickens at once with such a disease, who has not been previously exposed to malarious influences.

The second kind of malaria is that which is incident to certain localities, and known to proceed from peculiar causes. It is contained in the noxious effluvia often generated on ship-board, in filthy and overpeopled houses, in slaughter-houses, in grave-yards, in the putrified offal from dwellings, in the sewers of cities, and especially in the depositories of human excrement. This variety of malaria is the source of so many diseases that it would be almost impossible to enumerate them. Those already spoken of as being occasioned by the bad air of confined apartments are of course among them; but there are probably few diseases known to medical practice that do not more or less proceed from it; and many of them, unlike those which emanate from common malaria, are, in turn, self-propagative and almost perpetual in their succession.

Of the variety of malaria herein first named, it is not the purpose of this article to treat; but on the second, a few practical remarks will

be offered: The removal of everything offensive from the habitations of man, and from their proximity, is demanded by every consideration of health, comfort, delicacy, and true economy, even were it not useful for the purpose of enriching the soil. Notwithstanding the apparent apathy of the world to this truth, there is little room to doubt that, could the prejudice herein alluded to be dissipated, and means of promptly removing such nuisances without the spread of unpleasant exhalations, provided there are no persons worthy of the least consideration to be found in any community who would not cheerfully and promptly acquiesce in the arrangement, at any reasonable cost. What is it that is proposed to be removed? Almost everything that renders a city either uncomfortable or unhealthy; as the fecal matter from privies, which, sinking into the earth, contaminates the water of every well, and the effluvia of which so impregnates the atmosphere that the sense of smell, is forever offended by vicious odors, instead of being gratified by agreeable perfumes; and the vegetable and animal offal, as well as the liquids from the kitchen, which now decompose in the vicinity of dwellings, becoming putrid in gutters, sinks, and sewers, send forth exhalations scarcely less offensive than those proceeding from the depositories of human excrement. In all these substances, there is a great predominance of serous fluid, or water—three-fourths, indeed, in much of it. So long as a particle of this water is retained in it, so long is progressing the exhalation of ammonia, carbonic acid, and sulphuretted and phosphuretted hydrogen gases, which both offend the sense and impair the physical condition of man. No system of purification is therefore adequate to the purposes held in view that does not remove the liquid as well as the solid portions of these offensive matters. It is the liquid portions, only, which flow into the sewers of cities and pass thence into canals, rivers, &c., to render noisome and pestiferous the very waters that were intended to lave and purify the shore. The current of the polluted Thames may be discerned in the ocean many miles from its mouth. The turbid filth that current bears along sluggishly towards the sea is again and again thrown backward by the resisting tides, until its accumulation shocks every sense, while, through hundreds of sewers, its slime is still flowing into that receptacle of unendurable stench, and yet of wasted manure, more valuable every year than all the guano England annually imports.

Almost every town and village in the world is a miniature of London, except that its most elegant and luxurious homesteads often stand, even in closer proximity to the nuisances created by squalid neighbors, and that in many, even the sewage system of London has not been introduced, and the putrid drainings from everything foul sink into the earth to pollute the water, and anon the air, instead of flowing off to a river or canal, where the evil of its influence is only different in degree.

An intelligent and accurate scientific gentleman, of London, (Professor Guy, of Russell Institution,) made a publication a few years ago, which has since received very general sanction, on the subject of the health of towns as influenced by "defective cleansing and draining," in which it is stated that, while the annual mortality of

England is equal to about 2 per cent. of the population, the annual excess of deaths in thirty-seven of the largest towns in an average of the years 1841 and 1842 was 28,505. In the larger towns of Britain and Ireland, he estimated the excess to equal 60,000 deaths annually. This is the excess over the average of the whole, and of course much less than that of the towns over the country; and it it is alleged to be caused, not by the omission of drainage, but by the neglect to drain well, or by defective drainage.

In the contemplation of this subject, humanity might suggest other bases of comment, but political economy and arithmetic will of themselves guide us to startling conclusions. Thus, it is assumed by the writer named, for each "unnecessary death due to defective drainage," &c., we may assume the cases of "unnecessary sickness" occasioned in like manner at twenty-eight; and further, "the loss and cost of all the preventable sickness and death annually occurring in the United Kingdom may be fairly estimated at £20,000,000," or $100,000,000.

About the same period, a paper "On the Physical Causes of the High Rate of Mortality in Liverpool," was read before the Literary and Philosophical Society of that city, by Dr. W. H. Dungan, the statements in which were subsequently well approved by the press of that city. In reviewing this paper a learned scientific journal of London expresses the pleasure of its editors in being able to say that "all the towns of England are not open to the same amount of censure." This remark may also be made of the cities of the United States; yet in the account given may be found a portraiture, though highly colored, of every city and large town of this country, as well as of England.

From this paper, we learn that Liverpool is the most unhealthy town in England, one death occurring annually for every $28\frac{7}{100}$ persons, while in London there is one in $37\frac{3}{100}$; in Birmingham one in $36\frac{7}{100}$; in Leeds one in $36\frac{7}{100}$; in Sheffield one in $32\frac{3}{100}$; in Bristol one in $23\frac{3}{100}$; and in Manchester one in $29\frac{6}{100}$. These ratios are computed upon the estimates for 1838, 1839, and 1840. The average duration of life, in London, is nine and a half years, while in Liverpool it is but seven years and three-tenths. Could the sanatory condition of Liverpool be brought up to that of Birmingham, it would prove a saving of 1,250 lives annually, and yet the sanatory condition of Birmingham was far from being good, and the poor and destitute were not particularly well cared for.

This condition of things in Liverpool was chiefly attributed, first, to close, ill-ventilated habitations; second, to an overcrowded population (but for whom there is plenty of room and plenty of light and air between earth and heaven); third, to the omission to remove refuse animal matter; and fourth, to the deficient drainage. Of the 223,000 inhabitants of that city, about 160,000 belong to the working classes, a large proportion of whom dwell within courts and cellars. These courts are alleys from 9 to 15 feet wide, running laterally from the streets, through archways, under the large street buildings. There is no other way of ingress nor egress, and all the

air or light they receive is from above, though the two rows of houses thus facing one another are generally three stories high; and, as they back against the houses of other courts, there can of course be no current of air through them. The rooms of these houses are generally 10 or 11 feet square. The cellar rooms, in which these people also dwell, are 10 or 12 feet square, and sometimes less than 6 feet high, and though usually paved, are not unfrequently without even this comfort. The door, the top of which is seldom higher than the foot-walk without, is very often the only aperture for the admission of light or air; and sometimes a back cellar is used as a sleeping apartment, frequently receiving all its air and light through the door first described. Darkness and dampness, of course, prevail in these cellars. The streets in which the more favored portions of the laboring people live are sometimes but 5 yards, and seldom more than 10 wide. And yet in all these streets and courts, and in the cellars, wherever they are, families are crowded together in a manner incredible to those who have never witnessed such scenes.

Even if the most perfect system of cleanliness were observed by the people so confined, they could hardly be expected to realise good health, because of the want of ventilation. Efforts to provide more comfortable dwellings for the working classes in London and Liverpool, have, of late years, been made, and in these efforts his royal highness Prince Albert has earnestly participated. In constructing model dwellings for a comparatively small number, the success has been very good; but a general imitation of these dwellings for the use of others will of course progress no faster than the interest of landlords may induce them to rebuild the now existing houses, or to convert them to other uses and provide dwellings for the poor in other localities; and experience would indicate at least a century as necessary for the performance of this work. Wisdom and benevolence, therefore, point to the purification of the present abodes as the paramount duty to be performed. The first step towards the accomplishment of this purpose should of course be the introduction of pure fresh air into every apartment occupied by any portion of the human race. The light of the sun's rays may not be thus transmitted at present, though recent experiments with reflectors give some hope even of this; but the atmosphere, as pure at least as it passes over the roofs of the houses of Liverpool or any other crowded city, may, at very small expense, be conducted in any desired quantity to every room in any dwelling, even to the deepest subterranean vault. All that is necessary for this purpose is, the construction of small wind-sails upon the roofs of houses in such a manner as to

> ——— "arrest the gentle breeze
> And bend before the blast."

Descending from these into all the apartments of each house, there may be tubes of wood, tin, or even canvas, susceptible of contraction and expansion at the lower extremities, at the option of those whose comfort and health they are designed to promote. This would be but a simple modification of the means used, time out of mind, on shipboard, for the ventilation of the lower decks and holds. That means

so feasible, so cheap, and so salutary, are not in general use, wherever currents of air cannot be otherwise obtained through houses of any description, can only be accounted for upon the hypothesis that the importance of ventilation has not been sufficiently understood, or that the regard for human life has nowhere been such as should be cherished in a Christian land. The former is of course the cause to which may be chiefly attributed this apparent neglect.

But the most perfect system of cleanliness is not observed, either in Liverpool or in any other city of which I have any knowledge; and the most important movement that has been of late years made towards approaching it is in the institution of an exceedingly expensive system of drainage, which is the best that can be done under the present order of things, but would be almost totally unnecessary were rational views on fertilisation to prevail. In spite of this system, from 1,700 or 1,800 persons die annually, in Liverpool Parish, alone, of contagious diseases, and the mortality among children by convulsions, known to proceed from deficient ventilation and foul air, is enormous. That Liverpool is a great mart of commerce, that vast fortunes are being constantly accumulated there, that thousands upon thousands of the people live in the most affluent luxury, is all true; but it only serves to show how the happiness of a people is often disregarded in the desire to promote some great interest, which ministers to the pride or cupidity of the ambitious few, even though, as is generally the case, that few, in obedience to the law of Nature which coerces a sympathy among all men, irrespective of condition, subjects them to the very evils their avarice has inflicted upon others. Thus we find, that, while the average age at death of "the gentry and professional men" of London is forty-four years, of Bath fifty-five, of Leeds forty-four, and of Manchester thirty-eight, in Liverpool it is but thirty-five years—the just penalty of the violation of Nature's plainly revealed law.

In the enumeration already quoted, of the four presumed causes of the mortality of Liverpool, it has been made sufficiently apparent to every reflecting mind that imperfect ventilation and overcrowding are evils that may be measurably, and indeed very considerably corrected, at any moment in which the will is formed to do it. The landlords and tenants may coöperate to effect the needed reform; or, what would prove still more efficient, municipal laws adequate to the object might readily be enacted and enforced. The subject of efficient drainage is of course everywhere entitled to the closest attention, whether in country or town. Without this, no home can be comfortable nor healthy, and no soil preserved in its integrity. But it is to a due attention to "the *removal* of refuse animal matter," and of refuse organic matter of all kinds, that we are to look chiefly for protection from nuisances and disease; not its removal by deposition and infiltration into the earth, nor by the exhalation of its volatile particles into the surrounding air by means of exposure to the sun; nor by the flow of its putrid solutions through offensive and disgusting gutters and sewers in the pursuit of some great colon, whence to pour into and corrupt the adjacent waters, that would otherwise be well adapted to enhance the health and beauty, as well as to facilitate the commerce of the place.

The removal of all offensive matter from our dwellings or premises, and especially of the urine and fœces of men and animals, must be effected by other means. This duty must be executed frequently and thoroughly; first, because our health and comfort require it, and, secondly, because a wise economy demands it. Upon the former reason nothing more need here be said; but the latter presents considerations of paramount importance.

The desire of the times, whether wisely or not, appears to be for concentrated manures, and as inodorous as possible. Up to this moment, no other fertiliser that has been discovered is regarded as so valuable in these particulars as the better qualities of guano, consisting principally of the excrement of sea-fowls, their carcasses, feathers, eggs, &c., which is found on or near the coasts of South America and Africa. The most approved, and that generally used is the "Peruvian," and of this the most recently deposited is preferred. That the materials of which it is composed are superior to like substances found in other portions of the globe is not presumed; but, from the uniform temperature, and exemption from rain, of that region, the vast deposits are preserved from decomposition, and the consequent loss of their fertilising properties, which have become diffused throughout the whole, assimilate with all its particles, and exist in their nascent or evolving condition when the guano is deposited in the soil it is intended to enrich.

Analyses of the best Peruvian guano have shown its constituent elements to be about as follows:—

Water,	13.73
Organic matter and ammonical salts,	53.16
Phosphates,	23.48
Alkaline salts,	7.97
Sand,	1.66
	100.00

The ammonia, which is equal to about 17 per cent., and the phosphates, impart to guano nearly all its fertilising value, the small portion of alkaline salts comprising the only other virtues it possesses; and it has been correctly assumed that the value of guano may be estimated by a knowledge of the quantities of ammonia and phosphates it contains in their nascent state. Professor Way, of the Royal Agricultural Society of England, after a careful examination of the subject, has decided the value of ammonia to be 6*d.* sterling, or 12½ cents per pound, and of phosphates 3 farthings, or 1½ cents per pound. Therefore, in a ton of 2,000 pounds of guano,

17 per cent. of ammonia is equivalent to 340 pounds, at 12½ cents,	$42.50
23.48 per cent. of phosphates is equal to 470 pounds, at 1½ cents,	7.05
Value of alkaline salts, say,	4.45
Making the value per ton,	54.00

This is somewhat below the present market price of the article, and may possibly vary as much from the value of its constituent parts as procurable in other forms at this moment; but it will afford a basis of calculation in any stage of the guano market.

Having, then, ascertained by the standard adopted, the value of this richest of applied fertilisers, let us learn by a similar standard the value of one that, instead of enriching our lands, is not now applied, but is permitted to run to waste near our houses, and to produce disease and death in the manner already described.

Human ordure, in its natural state, contains about three-fourths of its weight of water, which, holding in solution a very large portion of volatile matter, consisting of ammonia, carbonic acid, and sulphuretted and phosphuretted hydrogen gases, occasions in its escape, caused by evaporation or otherwise, the loss of these valuable elements. The experiments which have been made to concentrate this manure by evaporation and the condensation of its residuum, by the production of "poudrette," or by whatever name it may be called, have hence been generally attended with the defeat of both purposes aimed at, namely, the suppression of noxious odors, and the retention of the most fertilising properties of the material.

The solid portion of "night-soil," after desiccation, with the retention of its gases, is indeed an exceedingly fertilising and stimulating agent, and has been pronounced by Boussingault equal in value to ten times its weight of farmyard manure; or, with the water it contains, it is equal to about two and a half times its weight of such manure.

The analysis of human fœces by Berzelius shows the constituent elements in their natural state to consist of

Water,	73.300
Insoluble animal and vegetable remains,	7.000
Mucus, fatty and other animal products,	14.000
Bile,	0.900
Albumen,	0.900
Peculiar extractive matter,	2.700
Chloride of sodium,	0.309
Sulphate of soda,	0.155
Carbonate of soda,	0.271
Phosphate of magnesia,	0.155
Phosphate of lime,	0.310
	100.000
Per-centage of ash,	1.200

But this matter always contains a very large quantity of human urine, one of the most powerful of all fertilisers, as the following analysis, also by Berzelius, will serve to show:—

Water,	93.30
Urea,	3.01
Uric acid,	0.10
Lactic acid, lactate of potash, and ammonia,	1.71
Mucus,	0.03

Sulphate of potash,	0.37
Sulphate of soda,	0.32
Phosphate of soda,	0.29
Phosphate of ammonia,	0.16
Chloride of sodium,	0.45
Chloride of ammonia,	0.15
Phosphate of lime and magnesia,	0.11
	100.00

Rich as the fœces are, then, the wealth of their depository consists chiefly in the accompanying urine, the removal of which is as essential for the promotion of health and comfort, as that of the former substance. It is true that, for convenience in transporting it to any distance, condensation is desirable; but, when it is remembered, first, that the contemplated sanatory purpose would thereby be defeated, and, secondly, that even greater dilution is necessary before placing this matter upon the soil, it must be manifest that, if it be possible to convey the whole bulk to the region it is desired to enrich, without the labor and expense of its desiccation, it should by all means be done.

Not only are the sweepings of every stable promptly removed from every city to the fields of the surrounding country, but a price varying from one to two cents per bushel is cheerfully paid for them by the thrifty farmer. Can it then be regarded as a thing impossible that matter so condensed as to be worth many times this price cannot be conveyed to an equal distance to be applied to the same purpose? The reply to this interrogatory will doubtless be, that the parallel between the cases is lost in the fact that the fetid nature of this matter, which renders it offensive and infectious in cities, renders it almost equally exceptionable upon the gardens and fields of the adjacent country. To meet this objection in a satisfactory manner, and to dissipate the prejudice existing on the minds of many with respect to the measure proposed, are the purposes here held in view.

As has been remarked, *dilution*, instead of *condensation*, is a necessary preliminary to the spreading of this fertiliser upon the soil; and this may be done to the extent of converting it all into a liquid before so applying it. There will then be nothing either visible or tangible to offend the senses after it has been applied; or its dilution may be absorbed by coal-ashes, charred corn-cobs, peat-soil, or other manures, and afterwards applied in a solid form. In either case, however, the first thing that should be done, even before disturbing it in its original place of deposit, is to *fix its volatile particles and render it perfectly inodorous*, a task than which nothing is more simple, and for the performance of which selection may be made among many agents.

In Belgium, this matter is simply diluted with water, and strewn upon the soil, the very powerful affinity of the earth for ammonia being alone depended on for the retention of its fertilising qualities; and the market gardeners near London also pursue to some extent the same practice. Saw-dust, and even sand, have been mixed with it

to absorb its moisture and render it portable, but certainly at the cost of a very unnecessary increase of its bulk. Ground gypsum has also been used, but, though valuable in itself, it is too slow in its action to be directly useful as a deodoriser. Powdered charcoal, the refuse bone-black of sugar refineries, half-charred peat, and even peat mould, and burnt clay alone, have all proved useful for this purpose. Quicklime has also been used, but it is injurious, inasmuch as it immediately liberates the ammonia and causes it to be lost. Sulphate of iron, or green copperas, readily fixes the volatile ammonia, and has been earnestly recommended, upon very high authorities, but it is by no means a fitting agent for the purpose, from the fact that, combining with the phosphoric acid, one of the most valuable elements of manure, it forms an insoluble salt of iron. In opposition to this view, and in defence of the use of this sulphate, it has been earnestly argued that iron, forming an exception to all other metallic substances, is found in wheat, trees, and in plants generally, as well as in the blood and excreta of animals, and therefore cannot be injurious to vegetation, when introduced into the manure designed to support its growth; but, while all the facts here adduced are admitted, the inference is not, and for the reason that, used in the manner proposed, it not only does not enter into the composition of vegetables, but also withholds the phosphoric acid from their nourishment. It may also be stated, that so minute is the quantity of iron entering into the composition of plants, that it is indeed very rare that a soil has to be replenished with it at all.

Muriatic acid is perhaps one of the most economical, expeditious, and powerful deodorisers, costing not more than 2½ cents a pound, and instantly depriving the most offensive substances of all appreciable unpleasant exhalations, uniting at the same time with the ammonia, and forming a most fertilising salt.

The charcoal of bones, in consequence of its porosity, and of corncobs, from the same reason, is of great value for this purpose, and, like most other substances named, may be used with great economical advantage in all kinds of manure, serving, as it does, to retain such excess of ammonia as the soil may not be capable of receiving at the moment of its escape.

Either with or without resort to any mode of deodorisation, the matter here treated of is in many localities dried and manufactured into fertilisers of various names: At Paris, Vienna, and Frankfort, it is made into portable manure, under the names of "humus," "poudrette," &c.; but, in the drying process, the noxious effluvia is always eliminated, and, as has been before stated, the most valuable constituents are lost. In China, earth saturated with this matter, is formed into cakes, called "taffo," and sold in large quantities for the purposes of manure. The process of drying by evaporation in the sun and air is slow, tedious, and exceedingly disgusting; when done by artificial heat, the time consumed is less, but the offensiveness is scarcely to be endured.

From the great variety of modes resorted to in preparing this manure for the soil, it is manifest that there has long been a want of some cheap, expeditious and efficient means for rendering it fit for the

purpose. Few, however, have seemed to be aware of the fact that the sulphuretted hydrogen, which escapes in such large quantities, is not only so deleterious as to suffocate a bird when the air is infected with it to the extent of $\frac{1}{1000}$ th part, a dog when $\frac{1}{1000}$ th part, and a man when $\frac{1}{1000}$ th part of its bulk, but that this gas, when eliminated in undue quantities, also exercises the same baneful effects on vegetation, the leaves of which, being the respiratory organs, wither and turn yellow under its influence. It is obvious, therefore, that a due regard for the health of man, as well as of vegetables, alike demand its confinement to the soil, in which it subserves, by assimilation, a useful purpose as a manure.

At Paris, night-soil is rendered inodorous by gradually pouring into the box or vessel containing it a solution of the sulphate of zinc and chloride of calcium, until it ceases to exhale an unpleasant smell upon being stirred. It is then conveyed just beyond the gates of the city, and converted into a valuable fertiliser, by admixture and drying with other substances. The same remedy may be applied from time to time, if necessary, for the purpose of keeping down such odors when the matter is deposited in gardens or fields.

As it has thus been shown that the health of cities and the wealth of the country may both be essentially promoted by the suppression of all offensive exhalations from the depositories of human excrement, but little need be added in the way of counsel, either to the intelligent and practical farmer of the country, or to the equally interested denizen of the town. The frequent, say at least weekly, if not daily, removal of fecal matter from its place of deposit, the provision of suitable receptacles for it, as well as of proper vehicles in which to transport it—the manner of its application to the land, whether diluted or comminuted in the form of a compost with other manures, loam, peat, &c., and the mode of administering it to the plants, are subjects to be well considered and determined, and to which, in connexion, with what has been communicated in this paper, the attention of the country is earnestly invoked. D. J. B.

ON THE MANUFACTURE OF SALT.

BY WILLIAM C. DENNIS, OF KEY WEST, FLORIDA.

As far as my knowledge extends, there is no great agricultural country but ours where common boiled salt, either from sea or spring water, is generally or even considerably used for culinary purposes. In Holland, they re-dissolve two or more kinds of solar-evaporated salt, one of which is "French bay salt," in sea-water; and this incorporated pickle is carefully purified in various ways, and then re-crystalised, before it is considered fit for use. From the use of this

salt, numerous writers ascribe the superiority of Dutch herring, over those of their neighbors. Even in Poland, which has the most extensive salt mines in the world, French bay salt is generally employed, not only in preserving provisions, but, what appears more singular, as a manure for their wheat lands.

In all countries where the French bay salt is known, its superior quality is acknowledged. Some years ago, the commissioners of supplies of the army and navy of Great Britain employed Dr. Henry, of Oxford, to examine different kinds of salt, with the view of improving their own domestic article, so that it could be safely used for salting provisions for those services; but, in an essay which he wrote on the subject, he failed to suggest any remedy, ascribing the superiority of solar evaporated salt principally to the greater hardness of its crystals made in that way, over those made by boiling. There is without doubt much truth in this; but Dr. Watson, of England, who wrote about the same time, probably discovered the chief cause of the superiority of solar salt. His idea was that, by the slow process of evaporating brines by the heat of the sun, the chemical affinities of each particular kind of salt, which might be contained in those brines, had time to act; and they re-deposit themselves distinctly and separately, one kind of salt not being compelled, as it were, to mix with another, as it must necessarily do in the rapid process of boiling down brines and crystalising the salt in kettles. So far was he convinced of this, that he urged the use of coarse canvas on an extensive scale, which was to be dipped in the brine, and then exposed to the sun and wind to hasten the evaporation. Yet, as far as I can obtain information, nothing has been done in England to improve the salt made there, so as to invalidate the truth of some remarks made in Ree's Cyclopedia, just after the close of the general war in Europe, in 1815, on the subject of French bay salt. This writer says: "The English and Dutch have often striven hard, in time of war, to do without the French salt, and to that end have endeavored to take salt from the Spaniards and Portuguese; but there is a disagreeable sharpness and acidness natural to this salt, which renders it very unfit for salting flesh, fish, &c. To remove this, they boil it with sea-water, and a little French salt, which they procure by the aid of neutral nations, and which not only softens it, but increases its quantity by one-third. But it would seem that their refining does not succeed to their wish, by the eagerness with which they return to the salt of Brittany as soon as any treaty has opened the commerce." The same writer goes on to say, that the French government makes enormous sums out of the salt-works of that country. Nearly all European nations, in a great measure, strive to be independent of others for their salt. Great Britain exports much more than she imports, besides making the great quantity which is there consumed yearly in the arts, and for manure. Salt is manufactured at various places in that country; but the great bulk of it is made near Liverpool, on the opposite side of the river Mersey, by dissolving the impure rock-salt from the mines of Cheshire, in sea-water, which brine is boiled down and crystalised by a very rapid process, that leaves the salt both impure and very light, only weighing 52 pounds to the bushel; while good solar salt

weighs from 70 to 75 pounds, a difference of more than 20 pounds. This Liverpool salt we import to an enormous amount; yet no other people than ours use it for salting provisions, except those living in Canada, or perhaps Australia. There is also a kind of salt made in England and Scotland, which is tolerably pure, and is frequently used for domestic culinary purposes. This is the "cat salt." It is crystalised on stakes placed perpendicularly below the baskets in which the salt is put to drain when drawn from the boilers, or kettles. Thus do they make a small quantity of salt, rather purer than the great bulk of it; and every one who is acquainted with chemistry can see why this "cat salt" is much better and purer than that drawn from the kettles. Common salt crystalises much more rapidly than any other contained in the brine, when it is at the proper strength; consequently, alone, it would be apt to crystalise on the stakes, the impurities of every kind having a chance to flow off, which is not the case when the salt is rapidly crystalised in boilers, as in the latter case it is necessarily incorporated, more or less, with the crystals of chloride of soda, or common salt. In fact, the crystalisation can be by no means perfect, nor the crystals pure, where the progress is so much hurried, as is the case where salt is boiled.

All the salt made in the United States, with few exceptions, is liable to the same objections, in a greater or less degree, to that which is made in Great Britain, as it is almost the universal practice to evaporate the brine by boiling. But I am informed that solar heat is used to a limited extent for evaporating the brines at the salt-works in the State of New York, and likewise in many of the works in the great Salt basin of the Kanawha river. To effect this, shallow wooden pans, or tanks, are erected, well above the earth, in long lines, but of limited width, so that covers can be rolled on or off to protect the pickle from rains. It will be seen, when we come to the French method of making salt, that even this degree of tardiness in evaporation is of great use in purifying the brine, wherever it is practised.

The French method of salt-making varies, in many particulars, in different parts of that country; but one principle is observed in all places: That is, to keep the brine, or pickle, moving slowly from one reservoir, or basin, to another, from the commencement of the operation till it nearly reaches the point of saturation. This is effected on the salt-marshes near the mouth of the Loire, by letting sea-water into large reservoirs, built for the purpose, at the time of high tides, by the means of swing-gates which close when the tide recedes. From these reservoirs the water in them, being of sufficient height, is let into a series of smaller reservoirs and pans, to a depth of a foot, down as low as 4 inches, the latter being the usual depth of pickle when crystalised in pans. When these pans are "set," as they say, sea-water is let out of a large reservoir, whence it finds its way slowly into the whole series of smaller reservoirs and pans, care being taken that only a very shallow "charge" is let into the crystalising pans, while the pickle is weaker than about 18°, Baume's hydrometer. To get brine into these pans, from a great reservoir, in many works, it has to traverse from 3 to 10 miles, which is effected by its widening from reservoir to reservoir, and from pan to pan; the distance being

likewise increased by long narrow passages. After the first charge, no water is let into the crystalising pans weaker than 18°, and even the first charge, by the management indicated, is nearly up to that. The crystalising pans are last in the series, and from the fact that, as the brine flows forward, that behind "pushes," as it were, that which is before it, forward, without mixing with it. As the sun evaporates the water from the whole works, the water which is daily let in from the sea to supply its loss, instead of mixing with the strengthened brine, forces it forward from reservoir to reservoir, until a part of it arrives at the last crystalising pan in the series; by which time, if the passages be of sufficient length, the pickle will be up to saturation, ready to deposit crystals of common salt. Great ingenuity is frequently shown by arranging even small works so that the pickle will flow a great distance before it arrives where it is to be crystalised.

The principle can be extended to suit the size and form of the works, from the fact stated that in feeding them from the great reservoir, the incoming water pushes the brine before it without mixing to much extent, so that the brine can be evaporated to the point of saturation, in the crystalising pans, in a much shorter time than if the water were let in directly to all parts of the works to supply the daily loss by evaporation. For instance, take a series of twelve small reservoirs: Let it be supposed that the water is let into all of them to the depth of 6 inches. In one day, a quarter of an inch is evaporated out of each. Now, instead of letting the water into each one separately, to supply this loss, we will suppose that the whole twelve quarters (3 inches) be let into No. 1; it does not mix, but pushes forward 2¾ inches of water into No. 2, which has had the advantage of one day's evaporation. From No. 2, there is 2½ inches of brine of like strength pushed forward into No. 3; and, so on, till we arrive at No. 12, into which only a quarter of an inch of brine has been pushed of the same strength. Again, there is a quarter of an inch evaporated out of each, on the second day; and again, on the morning of the third day, we will say, there is another 3 inches of water let into No. 1, and the loss supplied to each as on the day before; but it will be seen from what has been said that, except No. 1 and No. 2., perhaps all the rest have had their loss supplied by brine which has had the advantage of two days' evaporation. On the fourth day, all except some two or three of the first would have their loss supplied by brine which has had three days' evaporation. This same system being preserved, on the twenty-second day, No. 12 would be up to the point of saturation, and in six days more would be ready to rake; and before the end of forty days, even in so short a series as this, full half of these reservoirs, or pans, could be raked, which makes this French plan of vast importance in a climate so variable as this; for, frequently, a very good yield of salt can in this manner be secured, when not a crystal would be found if the Spanish and Portuguese method were adopted. To feed each pan directly from sea-water, it would take full ninety days to perfect the deposit, ready for raking, when it might then all be lost by rains, because they all come at once, and if a large one, it might take three more months to rake it. By the French plan, the whole deposit does not take place at once;

but, at the end of ninety days, quite a large quantity would be saved Furthermore, this plan is of still more value, by its depositing al impurities by themselves. Sea-water, by Baume's hydrometer, i from 4° to 5°; and as soon as it is strengthened up to 6°, it begins t deposit lime, which finally assumes the form of marl, and afterwards under certain circumstances, soldifies into rock. After the water get stronger, if it be kept in slow motion, these deposits gradually becom much greater, to which are now added sulphurated hydrogen, bro mine, and probably iodine. When it gets as high as 12°, it begin to deposit sulphate of lime in crystals, and the quantity of sulphura ted hydrogen is increased, and the bromine is so freely deposited tha every substance in contact with the brine is stained a deep-red; but after the pickle is evaporated up to 18° or 20°, it appears to deposi nothing more till it gets up to 25°, when the brine is in a state o saturation with chloride of soda, (common salt,) and it then begins t crystalise, and in about six days more, in good weather, it deposits layer of crystals, which are sufficiently hard, or, as it is termed "ripe," to rake. The "sharpness or ferocity" of the Spanish an Portuguese salt (Cadiz and St. Ubes) is easily accounted for by th manner in which it is made. The sea-water is let directly into th large pans, where the salt is ultimately crystalised; and, before th brine is evaporated to 25°, the bottoms of the pans are covered 2 c 3 inches deep with impurities, and in this bed of filth the commo salt crystalises. But when it is raked, instead of the transparer white crystals of pure salt, we see them stained a reddish-brown, an the taste alone indicates that they are highly charged with both br mine and iodine, besides other impurities. Much of this salt cannot b used in less than a year after it has been raked; but it never los that disagreeable "sharpness and ferocity." The same remarks a ply to the salt made in the Azores, or Western Islands.

So valuable is French salt considered, that the same principle o manufacture is applied in the south of Germany, as near as their cl mate will admit. In connection with an extended surface, arrange after the manner above described, they have enormous tanks wit moveable covers, into which they gather the strengthened pick when they fear rain, and there secure it until good weather, when is spread again till it is up to the point of saturation, or nearly s when it is secured in these tanks to await being crystalised, whicl instead of being done in ground pans, is usually performed in lar lead boilers; or more frequently, what is much better, they pump u the hot saturated pickle into small tanks placed around the top of frame some 20 to 30 feet high, and of convenient dimensions, c the ground. From this hang ropes perpendicularly, some 6 inch apart, on which small streams of this brine are conducted from tl small tanks, and the crystals form rapidly on them—in fact, so rapidl as stated by Dr. Ure, that the same work, in proper weather, can done in this way in twenty-four hours which would take three or fo days by boiling in kettles, besides making the salt much pure When these ropes are sufficiently loaded with salt, it is knocked off fall on the floor beneath, when it is ready to store or for market.

One might think this a wasteful mode of crystalising salt; bu

from some experiments I have made, I am satisfied that, with proper care, as little is lost as by any other process. Furthermore, I believe that in this climate, (Key West,) it will not be necessary to heat the saturated pickle at all to crystalise salt in great perfection. Hence there can be no doubt that salt can be made principally, if not wholly, by solar heat, anywhere in the United States south of New Jersey, in suitable places on the sea-board. In the south of Germany and in many parts of France, they do not depend entirely on evaporating the pickle by the system above described, on the ground, but increase it, especially while the brine is yet weak, by arranging bundles of faggots perpendicularly in frames which are frequently from 20 to 30 feet high, and 50 by 100 or more feet on the ground. The brine is repeatedly pumped up to the top of this frame, and let down in showers through the faggots. Any one must see that evaporation is very much increased by presenting so great a surface to the wind and sun.

I have been thus minute in setting forth the high value placed on solar-evaporated salt, manufactured after a particular manner on the continent of Europe, and, likewise, for the purpose of showing the great difficulties and expense many nations there seem to think it to their interest to encounter in order to obtain an article of this sort.

I will now add some of my own personal experience in the way of salt-making in this region: In 1836, there was a salt company formed on this island. Wooden pans, like those formerly used at Cape Cod and New Bedford, were erected to a considerable extent. I believe there were put up at that time, about 3,000 feet, linear measure, of these works, which were 16 feet wide, and had covers to roll on and off, to protect the pickle from the rain. Of the natural ponds on the island only very small portions were improved, and this solely for the purpose of strengthening the sea-water before it was pumped into the wooden works; but no attempt was made to make salt in ground pans. Although they made four or five times as much salt in these wooden tanks, in a given time, as could be made in a like amount of works, in New Bedford or Cape Cod, from the fact that they could generally evaporate the pickle to saturation before pumping it up; yet they could hardly be said to be successful. The salt which they made was very pure, as they adopted the plan of having the pickle traverse a considerable distance before pumping it into the works where it was crystalised; and it acquired a very high reputation for salting beef and fish; but the crystals were too fine for pork. In 1846, these wooden works were nearly all destroyed by the great hurricane of that year, after which this company sold out to a private individual, who re-erected some part of the works in wood, out of the debris of the storm, and turned his attention to making ground pans for the purpose of crystalising salt in them. He did but little in this way; yet he was quite successful, in 1847–48, making over 70,000 bushels per annum with four or five hands on the place. In 1849–50, he made less; but, considering the limited amount of improvements, he had a fair yield; having raked about 50,000 bushels in these two years. In 1851, the works came into my possession, but as I had only commenced the business, and the season being very

short, I raked only about 20,000 bushels out of the ground pans, besides some 15,000 bushels produced in the covered works. This was done with the average labor of only six hands. The year 1852 was very wet, and the crop small; and, in 1853, more rain fell than was ever before recorded. In the mean time, I gave my chief attention to improvements, and last year, (1854), I made full 70,000 bushels, although about 20 inches more rain fell than the recorded average for nineteen years. Each month of the salt season had its due share of this excess, which was from February to August, inclusive. To make that quantity, required the average labor of eight hands for the year, to perform everything connected with it, in the way of securing and delivering for market. The present year, 1855, has been a very singular one for this climate, there having been scarcely a week, from February to the end of September, without some rain; and, in addition, the winds have been continually both cold and damp yet, from the nature of my improvements, on these occasions, in the course of the season, there was on the works almost an unlimited amount of pickle up to saturation, or nearly so. This pickle I could have saved, and afterwards crystalised on ropes, after the German plan, had I had the tanks finished, which are now well advanced. I should here state, that there has been a very singular increase of rain on this island for the last five years, including 1850 up to the present time. In this period, the average has been something over 50 inches of rain per annum, while the record of the preceding nineteen years gives an average of only 31½ inches. The Patent Office Report for 1853 gives the average of fourteen of those years at 31¼ inches. From this, the expectation is but reasonable that the yearly average must hereafter agree, or nearly so, with the record of the longest period; for it is known that those who made this record are noted for their accuracy. Yet, it is proved that salt can be made here in ground pans without the aid of covered tanks, during the years of the heaviest fall of rain to which the island is ever subject, provided the weather is otherwise favorable. In 1854, about 52 inches of rain fell, and, as before stated, a full proportion in the salt season; and the weather was otherwise hot and dry. I am informed that there has been a like increase in the fall of rain for the five years in Turk Island, and in the Bahamas, which I presume accounts partially, at least, for the scarcity of salt in those islands for the last two years, notwithstanding the great accumulation of the article there in former years. This scarcity makes it a part of wisdom and economy, in this country, to increase in every possible way the supply of the better kinds of salt.

To aid in this purpose, I will give a brief description of the plans which I have adopted here to make the most of these local advantages; and, when these plans are all perfected, I have no doubt that the business will be rendered reasonably safe and successful, even during the wettest seasons which we have on these Keys; and when such years happen as I am informed 1842–43 were, and again, those of 1847–48, the only limit to the yield of salt would be in the limit of the labor at command to rake and secure it. There are other Keys on this reef, which I presume have like advantages with this, and

when we consider the mildness and healthfulness of the climate, especially for a certain class of invalids, it would seem that these advantages are worthy of being appreciated.

Key West is almost four miles long, and nearly one broad; and from the north-eastern end, through the centre of it, for some two and a half miles, there are a series of natural ponds which are from one to two feet lower than medium high tides. These ponds were connected together, originally, but separated from the sea by a ridge, over which the water never flowed, except in times of very high tides. From this situation, even before the ponds were improved, salt was frequently made, naturally, by the high tides of early winter flowing into them, the water in them being sufficiently evaporated, before the return of the next high tides in the following July and August. Thus, as I have been informed, were many cargoes raked by the crews of vessels, and taken away. Outside of this low ridge, which shuts out the low tides from the ponds, I have inclosed a large bay with very shallow water, which contains some 100 or 150 acres; by connecting two points of land by a substantial dam. In this is fixed a swing-gate, such as is used in Turks Island and the Bahamas, which enables me to shut in the sea-water from the Gulf stream, at high tide. This arrangement is such that, by a short canal through the ridge, I can convey water at pleasure to every part of the natural ponds, which, by means of more than 20 miles of embankments, are made into a series of reservoirs that contain in full the principles herein laid down. Out of the bay, at a point furthest from the swing-gate, where the evaporation is sure to be the greatest, the canal is dug which lets the salt-water into the highest part, whence it flows from one into another, forward and backward, till it arrives at the last and lowest one in the series, by which time the pickle has traversed about 14 miles. In good weather, the water is not only purified, but is up to the point of saturation, or nearly so. At any rate, it is in a fit state to be pumped up by wind-mills into the crystalising pans, which in this case are built on a level from 12 inches to 3 feet higher than the reservoirs. These have bottoms prepared with sand and marl, which become quite hard, enabling us to keep the salt clean while raking it. These pans are also enclosed with stone and marl walls, and vary in size from 50 feet square to an acre or more. They are likewise arranged so that the pickle flows from the highest to the lowest, through the whole series, which still further purifies the water and hastens the crystalising atom. It is really astonishing to witness the amount of impurities which are thus deposited from the sea-water. In some of the reservoirs, at the end of the season, there are nearly 6 inches of the half-floating deposits of one summer.

I do not pump any but perfectly saturated pickle into the covered wooden pans, of which I have some 2,500 feet in length. The salt from these is very heavy and pure, being invaluable for salting beef and fish, but the coarse salt from the ground pans is better for salting pork. Fishermen, here, and in the vicinity, will use for their purpose none but the finer kind of salt made in covered works; and I have been informed that fish in the Havana market salted with it, even

when they are only "dry salted," command a higher price than those cured with any other kind.

I have from 300 to 400 acres of surface now in the series of reservoirs, and, by further improvements, I can more than double that amount. Of crystalising pans, I have from 50 to 60 acres, amply sufficient for the present surface of reservoirs; and I have room to increase to any necessary extent. The tanks which I am building are 50 by 100 feet on the ground, and 10 feet deep, 5 feet of which is dug down into the solid rock, but even this part of them will be lined with concrete, made of hydraulic cement, sand, and broken stone. They are to be covered by movable roofs, 20 by 25 feet, so constructed as to roll on and off from each side to the centre. These tanks, with ropes arranged as before described, to crystalise the pickle on, will render a fair yield certain, even in a wet season; and I think salt, crystalised in this manner, out of brine previously purified in the reservoirs, will be even better than that made wholly in the pans.

From personal observations of the use of Key West salt, I am convinced that no other, except, perhaps, the very best Turk Island, is so well fitted for salting provisions of all kinds. I say the very best Turk Island, for in a great number of the works there, and in the Bahamas, the salt is sold under the same general name, and where they have applied the purifying system, too, but to a very limited extent; and at many of the works salt is made after the plan adopted in Spain. It would seem that many brines have a disagreeable taste, which no practical method can remedy, and that on the whole, that made from sea-water is usually better than that which is made from springs. Furthermore, it is very probable that there is a great difference in sea-water from divers localities. This supposition is in a measure confirmed by the salt made everywhere from the Gulf stream, as it is better than that made in Spain, Portugal, the Azores, &c., all of which produce an article that has a sharpness of taste, which is never present in the other kind, made from the great ocean current; but even this kind varies much in quality by the pains taken in purifying the pickle.

It is only during the time of raking salt from ground pans, and sometimes for a month or more, when the demand is brisk, to deliver it, that many hands can be profitably employed at the salt-works here. Even in favorable years, a full force is not needed, after all improvements are made, for more than six to eight months. Consequently, some other business should be connected with salt-making on these Keys, the culture of Sisal hemp, for instance, in order to render it more profitable. During the rest of the year, only a few hands are required.

CONDENSED CORRESPONDENCE.

Statement of D. BARNES, *of Middletown, Middlesex county, Connecticut.*

Our principal reliance for manure is upon the barn-yard and the pig-stye; although wood-ashes, shell-lime, gypsum, guano, superphosphate of lime, especially the latter, are extensively used, and meet with favor. The quantity applied to the acre of the two last named is about 250 pounds.

The majority of our farmers plough under their home-made manures; and heavy crops of Indian corn are produced therefrom, particularly when the ploughing is much deeper than usual. Guano is applied by mixing it with gypsum and sowing broadcast. It is sometimes harrowed in, or used as a top-dressing on grass lands. It is also put in the hills of Indian corn and other hoed crops.

Statement of GEORGE P. NORRIS, *of Newcastle, Newcastle county, Delaware.*

Our farmers are yearly becoming more convinced of the great importance of manures, and much more care is taken to preserve them than formerly. Many depend entirely on their barn-yards, and that which was formerly allowed to waste and wash out on the highways, is now carefully saved in well-built cellars, or covered sheds.

Guano is much used by us. On neglected lands, it has produced almost miraculous effects. The usual mode of application is to plough under 300 pounds to the acre in a damp still day. I prefer to use it for my wheat and oat crops, and reserve my stable manure for top-dressing grass-lands and for corn. Great care should be taken to have the guano finely pulverised, as much of that purchased in the Wilmington market is intermixed with lumps, which require considerable labor to reduce them. I found the operation of breaking these lumps much facilitated by pouring water on them and suffering them to stand in a damp condition over night.

Statement of C. W. BABBIT, *of Metamora, Woodford county, Illinois.*

No manure is used on our naturally rich soils, except when the farmers are compelled to remove the accumulations from around their barns and yards. These, however, are highly beneficial to gardens, and apple-trees which have commenced bearing, as well as to grass, potatoes, and grain, on the lightest prairies, and for that class of soils termed by us the "barrens."

It would seem that the prairies here might be continued in their virgin richness simply by annually plowing under the stubble of our grain fields, and the stalks of Indian corn, never allowing them to be consumed by fire. A short distance south of this, resided two farm-

ers, one of whom every year gathered up his corn-stalks and burnt them, and also burnt over his stubble fields before ploughing. The other never allowed a stalk nor a straw to be burnt on his land, but always plowed them under. After some fifteen years had elapsed, the farm of the former yielded on an average some 15 bushels of corn less to the acre than when he commenced cultivating it, while that of the latter produced as abundantly as at first.

Statement of ALEXANDER HERON, *near Connersville, Fayette county, Indiana.*

The most common method of improving and renovating the soil in this county is by ploughing under a crop of clover, or by a rotation of crops of clover, wheat, and corn. This has proved to be the cheapest, easiest and best method, as the land continually becomes improved, and this to a very high degree.

Another good method is to turn the hogs into a field of standing corn, and allow them to fatten by feeding themselves. In this way, much of the substance extracted by the crop is returned again to the soil, which leaves the ground in fine condition for ploughing the succeeding spring. A field treated in this manner, has come under my immediate notice, which has been planted in corn and fed in the fields to hogs for twenty-five consecutive years, and the present season has produced the largest yield ever known before.

Statement of H. G. STONE, *of West Boscawen, Merrimack county, New Hampshire.*

Guano and artificial manure, such as super-phosphate, plaster, &c., have been used here, in some instances with advantage, but in others with injury to the crops. But the experiments in general have been too indefinite to ascertain correctly whether such manures are profitable to the farmer or not.

The effects of guano upon crops are generally the most apparent on old, poor, worn-out lands, rather than upon rich soils, or those which have been well manured. I have used it successfully upon corn and potatoes, applied at the rate of a table-spoonful to a hill, mixed with two or three spoonfuls of dried muck, covering it about an inch deep with soil, then dropping a spoonful of plaster to each hill with the corn. By this means, the plaster answers the double purpose of holding moisture, as well as taking up and retaining ammonia, and thereby preventing its escape. A compost of dried muck, plaster, and guano, sown broadcast, in a rainy day in the spring, forms a good top-dressing for grain or grass.

I have also applied to corn, side by side with super-phosphate, guano, &c., wheat bran, at the rate of half a pint in hill, at the time of planting, by which I obtained a greater yield. Used with barnyard manure, it gives good results.

Statement of EDWARD VAN METER, *of Salem, Salem county, New Jersey.*

Barnyard and stable manures are used for wheat and potato crops, and lime is employed to a considerable extent on corn. Green-sand marl, which abounds in the northeast part of the county, has proved most beneficial to potatoes and grass.

Statement of D. R. STILLMAN, *of Alfred Centre, Alleghany county, New York.*

The principal fertilisers used here are such as are produced on the farm, with the exception of gypsum, which is generally applied to corn, grass, and wheat. In dry seasons, the latter produces a marked benefit, but in wet ones, the effect is hardly perceptible.

Gypsum costs $8 a ton, and is sown broadcast on grass and grain, at the rate of 200 or 300 pounds to the acre. It is also applied to corn soon after it appears above the ground, at the rate of a large spoonful to a hill.

Statement of R. BUCHANAN, *of Cincinnati, Hamilton county, Ohio.*

In the cultivation of my little suburban farm of 44 acres, with 700 fruit-trees and 20,000 grape-vines, I have had abundant occasion to appreciate the value of manures. In the vineyard, and around the fruit-trees, an occasional application of ashes has been found valuable, alternating with stable manure every two or three years. I have twice tried salt, sown in March, on my grass lands, at the rate of a bushel and a half to the acre, with marked advantage. Gypsum has been sometimes tried by our farmers on grass, and found useful; but it is rather too expensive, say at $2 50 to $3 per bushel.

For our general crops, deep tillage and a little barnyard manure is all that is required, paying proper attention of course on the uplands to rotation, little or none being necessary in the bottom lands. Many farmers, with us, turn red clover under, and others plough in buckwheat; and they are well pleased with the results. As our farms diminish in size before an increased population, we shall learn from necessity the value of manure.

Statement of JAMES MCK. SNODGRASS, *of Mifflin, Alleghany county, Pennsylvania.*

Barnyard manure and lime are our principal dependence, although guano, bone-dust, and gypsum have lately been tried, and are regarded as good fertilisers by those who have used them.

The cheapest way to improve land in this and the adjoining county, is by the use of lime. It is not regarded as a direct fertiliser for our grain-crops, except as in a small degree furnishing food for the plants, but as a kind of stimulant, the effect of which creates a nour-

ishment favorable to grass. The best way to apply it is on the top of a sod a year or more before it is ploughed under. The quantity depends on the soil, and on the after treatment. Heavy clay can bear from 150 to 300 bushels to the acre, while, on light soils, only from 50 to 75 bushels would be required. The cost of lime at the kiln in this vicinity is 8 cents per bushel.

Statement of C. SNIVELY, *of Penn Township, Alleghany county, Pennsylvania.*

Our farmers depend chiefly on barnyard manure and lime as fertilisers. The custom in this vicinity is to haul quicklime on clover or Timothy sod, say 100 to 200 bushels to the acre, and the next spring apply a coat of barnyard manure; then plough under and plant to corn. Land treated in this way, will produce well for years afterwards. The cost of lime, where limestone and coal are found on the farm, will not exceed 7 or 8 cents a bushel.

Clover is sown by all good farmers, and no crop is better calculated to enrich the land. In the vicinity of the cities of Pittsburg and Alleghany, other fertilisers are used.

Statement of D. MINIS, *of Beaver Plain, Beaver county, Pennsylvania.*

Barnyard manure has not been used so much in this county as it should have been; but of late, there has been a marked improvement in its application to our crops. Now, but few of our farmers consider it a nuisance, and it is pretty generally hauled out in the spring and spread on the corn-ground. Applied immediately to our wheat-crops, it does not answer so good a purpose as when used for grass. Twenty cords to an acre, costing $5, in a favorable season, will increase a corn-crop from 30 to 40 bushels.

Poudrette, as yet, is but little used here, although it is one of the best fertilisers we have. Were it not for pride and prejudice, it would be extensively employed.

Statement of RICHARD LECHNOR, *of Stouchburg, Berks county, Pennsylvania.*

Lime and barnyard manure are the principal fertilisers made use of in this section. Of the former, 100 or more bushels are employed on calcareous clays, and 70 or 80 bushels on gravelly lands. It has been found to be particularly advantageous in the cultivation of potatoes, corn, and grass.

ROTATION OF CROPS.

CONDENSED CORRESPONDENCE.

Statement of NATHANIEL GREEN, *near Middletown, Newport county, Rhode Island.*

The system of rotation generally practised by our farmers is, to plant corn on pasture or meadow land, and succeed by oats, seeded down to grass, after which it is mown four or five years, and then broken up again for corn, and cultivated as before.

Statement of D. MINIS, *of Beaver Plain, Beaver county, Pennsylvania.*

With us, there is no established rotation of crops; yet, our best farmers endeavor to sow wheat on a Timothy, blue-grass or clover sod, or on oat-stubble, which has been cultivated with corn the previous year. They again sow on the wheat, in the fall, winter or spring, clover and Timothy, the great object being to keep the field as long as possible in grass.

Statement of RICHARD LECHNOR, *of Stouchburg, Berks county, Pennsylvania.*

The general system of rotation of crops in this county is, first, Indian corn on Timothy or clover sward, followed the next season by oats. The ground is then well manured, and sown with wheat or rye, seeding down again with Timothy or clover.

BREAD CROPS.

MAIZE, OR INDIAN CORN.

EXPORT OF CORN TO EUROPE.

To the mind of every intelligent inquirer into the uses to which the various agricultural products of this country are applied, a striking anomaly is presented in the fact that, although the experience of the people of the entire continent bears uniform testimony in favor

of the palatableness, the healthfulness, and the economy of Indian corn, or maize, our great indigenous Cereal, it is even yet but little known to the people of those portions of Europe to whom economy in the selection of food is manifestly the great desideratum, with the exception, perhaps, of some of the southern countries of that continent.

That maize possesses the advantages we here claim for it is proved, not only by the universality of its consumption among the American people, but by a comparison of its nutritive properties, as ascertained by chemical analyses, with those of any other production from which bread is made, and of the relative prices at which they usually sell in the markets of the Atlantic cities. Let us institute a comparison with respect to wheat and maize, the only species of grain, except rice, now to any considerable extent exported from the United States.

The analyses of Sir Humphrey Davy, which are relied upon as accurate in the average of numerous experiments, assign to wheat about 95 per cent. of nutritive matter, and to corn 77 per cent. A bushel of corn is therefore worth 77 cents, when a bushel of wheat is worth 95 cents, their properties of nutriment alone considered. But when it is remembered that the 23 per cent. of innutritious matter, which constitutes a portion of the maize, are desirable in food for man, as "necessary, not only to satisfy the craving of hunger, but to promote digestion by the stimulus of distention, which bulk alone can give," it will be comprehended that the comparative value of corn is greater than these strict analyses would indicate. Accepting, however, the nutritive constitutents of each as the standard of its value, let us see how it corresponds with the prices actually paid for them in our markets.

The quotations of the grain market of New York, made from day to day through several months of the years 1855–56, represent the average price of wheat on each of those days to be from two and a fourth, to a little more than three times the average price of corn; and a careful equation of these averages affords a higher mean than two and a half to one. Thus, when the price of corn is $1 per bushel, that of wheat is always at least $2 50 per bushel; but the intrinsic value of the two grains being in the proportion of seventy-seven to ninety-five, and $1 being the price of corn, wheat is not really worth in consumption more than $1 23⅓. In buying wheat, we therefore obtain, for any given amount of money, a little less than half the nutriment we obtain when we buy corn. Hence, the question naturally presents itself, what is the reason of this wide disparity in their prices? The reply first suggested to the mind is, that this is determined by the supply and demand, and that we must seek in these for the reason. Wheat, though of general and abundant product, is neither so universally adapted to the varieties of soil and climate, nor so reliable a crop in its most favored localities, as Indian corn; it is more relished by the greater portion of the human family; it may be preserved sweet more easily in any of its stages of manufacture, whether stationary, or during transportation by sea or land; and, finally, thorough, judicious, and persistent efforts have never

been made to introduce corn among the people of the Northern and Central European countries.

The admission here made that maize, in its various forms of preparation, is generally less relished than wheat, will doubtless be excepted to, and the experience of the people of vast portions of North America, who use the preparations of it from choice, may be cited in opposition to the opinion expressed; but the writer is speaking of corn and wheat as they are presented in commerce in the cities on the Atlantic and Gulf of Mexico, and not as in the home consumption of the people of the corn-growing regions, whose facilities and skill in preserving it, and in preparing it for the table, especially with the delicacies of the dairy that everywhere abound with them, enable them to enjoy it in a manner not often realised elsewhere. To them it is at once the great staple of life, and among the most relishable articles of aliment. But it is otherwise in the cities, where such skill and facilities are not possessed; and it is far otherwise in the countries of Europe, where many of the people are not even yet convinced that a palatable bread may be made from the flour of maize. Thus we find that, although cheap bread is, as has been said, the great want of Europe, the Indian corn exported from the United States is even yet far less in value than the wheat exported, as the following table will show:—

Amounts of Indian-corn and corn-meal, and of wheat, wheat-flour and wheat shipbread, exported from the United States during a period of thirty-four years, each ending on the 30th of June.

YEARS.	Value of corn and its manufactures.	Value of wheat and its manufactures.	YEARS.	Value of corn and its manufactures.	Value of wheat and its manufactures.
1821...	$616,279	$4,476,357	1839...	$799,516	$7,419,232
1822...	900,656	5,287,286	1840...	1,043,516	12,208,086
1823...	930,489	5,151,437	1841...	995,411	8,960,568
1824...	736,340	5,977,255	1842...	962,967	8,615,731
1825...	878,073	4,466,679	1843...	735,915	4,339,414
1826...	1,007,321	4,411,870	1844...	1,045,037	7,648,491
1827...	1,022,464	4,645,784	1845...	1,053,293	6,101,666
1828...	822,858	4,464,774	1846...	2,131,744	13,717,332
1829...	974,535	5,972,920	1847...	18,696,546	32,739,427
1830...	597,119	6,320,603	1848...	5,645,084	16,482,380
1831...	992,051	10,712,261	1849...	9,135,994	13,401,748
1832...	758,775	5,229,858	1850...	4,652,804	8,074,438
1833...	871,814	5,895,157	1851...	2,385,415	11,804,349
1834...	695,483	4,792,087	1852...	2,114,605	14,743,251
1835...	1,217,665	4,667,881	1853...	2,084,051	19,591,817
1836...	725,262	3,819,421	1454...	7,077,253	40,616,956
1837...	911,634	3,258,767	1855...	8,198,693	12,883,937
1838...	864,391	3,875,110			

From the facts here presented, it is apparent that if corn could be transported to the different countries of Europe, in good condition, and if the people of those countries could be instructed in its use as the Americans understand it, without in the least interfering with the exportation of wheat, which is not used by the poor of those countries, Indian corn would soon become the most important and most profitable commodity of export, as it now is the most important and most profitable product for home consumption. That success has not attended the efforts heretofore made to accomplish these purposes, is proof of nothing more than that they have either not been skillfully, made, or not persistently prosecuted.

Corn is sometimes, at least, as long on its transit by railroad, canal, and other avenues of conveyance, from the interior of this country to the Atlantic sea-board, as it would be on ship-board thence to Europe; it is preserved in cribs, granaries, and warehouses throughout the year; it is freely consumed by people of all conditions in all parts of this country; by the rich from choice, and by the poor in many instances from choice, and always in obedience to a wise economy. The barriers to its introduction throughout Europe, therefore, however formidable they have heretofore proved, cannot be insurmountable. Nothing more is requisite than the means herein already suggested.

The government of Prussia, wisely appreciating this subject, in the fall of 1855, caused a series of experiments to be made, which, though not entirely satisfactory, have been attended with a sufficient degree of success to induce the determination of continued effort, which there is good reason to hope may yet lead to permanent success. The causes of the partial failures in these experiments were radical. In the first place, the meal sent thither by his Excellency, Baron Gerolt, the Minister Resident of his government at Washington, though in less degree than other shipments, still was sour when it reached the hands of the agents employed to test it; and, in the second place, those agents, upon finding that it was not fine, like the flour made from wheat or rye, attempted to reduce it to that condition by regrinding. Those who are accustomed to the use of corn in this country, will be surprised to learn that any experiment with meal, thus impaired, could be regarded as affording even the least promise of success.

In their Report on the experiments made by them, the Prussian Board of Agriculture commence with an expression of the opinion that "a bread similar to the American would not be to the taste of our [their] public;" and accordingly no attempts were made to prepare the meal in any of the forms in which it is used in the regions of the world where its consumption has proved satisfactory throughout the experience of centuries.

From this Report we learn that the meal was conveyed to that country in barrels; that its coarseness, and the presence of its innutritious particles, were objected to; that it was sifted, and then reground by certain flouring mills, and of course but a small proportion of fine flour obtained; and that, though sour, it was not so bitter as that in use in Berlin, which the Board believed was either dampened by

the millers, or not carefully protected from moisture. The writer of the Report proceeds to say:

"Maize flour, even the finest quality, cannot be baked alone into bread. It ferments like other flour, but the dough falls in the oven, and gives a compact, soap-like loaf, which could not be eaten daily. Previous experiments had taught me, that a certain quantity of some other substance, as potatoes, was necessary to make maize flour a good substance for bread; a third part of wheat, rye, or potato flour, is sufficient for this purpose.

"I made experiments with fine and coarse rye flour, and fine and coarse maize flour. It was necessary to find out the most suitable way to raise the bread. From yeast, I did not expect any favorable result, as the application of yeast would be too expensive. The sour dough only remained as a way of fermentation, but it seemed doubtful if it could be used in a similar manner, as by the baking with pure rye flour a second and more simple way had to be tried. Instead of using a mixture of maize and rye flour in the accustomed manner, as it is usually done, it seemed more appropriate not to mix beforehand the different qualities of flour, but each one by itself, and in the following manner: to leaven the rye flour for itself, as it is usually done, and to knead in the maize flour with a sufficient quantity of water."

"The results of my experiments show clearly that maize flour, mixed with rye flour, has all the qualities necessary to obtain from it a good, palatable, and nourishing bread, in consequence of its rich and floury substance. I have further shown that this may be obtained by an equal mixture not only of fine, but of coarse rye flour."

"The difficulty of grinding Indian meal into fine flour is not an insuperable one, because the dough, consisting of two-thirds coarse, and one-third fine maize flour, made a bread nearly as good as that made of entirely fine maize flour."

"It is not necessary that the maize flour should be kneaded in with the rye flour; and, indeed, it is better that it should not be."

The Royal Police Department of Berlin, also, in December, 1855, made a Report upon "The Applicability of Indian Corn to the Preparation of Bread," in which it is stated that a few resident bakers in that city "prepare, in small quantities, bread of a mixture of maize and rye flour," and that maize is used to some extent in Dantzig also. It is inferred from the information obtained from these and other sources, that "a bread composed of two-thirds rye, and one-third maize, is about 10 per cent. cheaper than bread made of pure rye, a pound of rye and Indian meal bread, costing about 3 cents." The Report goes on to say that, "it is further ascertained that such bread is eatable, and not without a pleasant taste, although Indian meal is frequently found with a bitter taste." It is added that "it stales very quickly, and in this condition can scarcely be eaten."

Counsellor Surgeon Lück, the prison physician, after examining some of the bread made of two-thirds rye, and one-third maize, expressed the opinion that it was wholesome, and recommended its use in the prisons, but thought that, in consequence of its solidity, it

should be given chiefly to those employed in the open air. He was of the opinion that Indian meal was more healthy than the potato, and more nourishing than either wheat or rye.

The Police Department experienced the same difficulty with respect to regrinding the meal, that was encountered by the Board of Agriculture, and like that Board, persisted in the attempt to adapt corn-meal to use in that manner. We quote the somewhat unsatisfactory conclusion of this Report:

"In baking, five different experiments were made as to its mixture with rye flour.

"Ten pounds of rye flour and 2 pounds of maize flour gave six loaves of bread, of 3½ pounds.

"Nine pounds of rye flour and 3 pounds of maize flour gave six loaves of bread, of 3 pounds.

"Eight pounds of rye flour and 3 pounds of maize flour gave six loaves of bread, of 2½ pounds.

"Seven pounds of rye flour and 5 pounds of maize flour gave five loaves of bread, of 3½ pounds.

"Six pounds of rye flour and 6 pounds of maize flour gave five loaves of bread, of 3½ pounds.

Thus 40 pounds of rye flour, and 20 pounds of maize flour, gave twenty-eight loaves of bread, of 3½ pounds.

"The results of these experiments confirm the opinion previously entertained, that Indian meal absorbs less water, and on this ground produces less bread. than rye flour; they even show that the quantity is greater the more rye and the less maize flour. The taste of the bread from these mixtures was good.

"The experiments further show that the preparation of this bread demands particular care and attention, and takes much time. Maize flour must be gently kneaded, and a certain proportion between maize and rye flour must always be observed. This proportion cannot generally be regulated, and it changes in nearly every case, and in such a degree that it becomes necessary to examine properly the material which is to be used for baking, and to establish some minor experiments to test the true proportion of mixture. The age of the maize flour demands the greatest consideration, and in this case, if we take only a trifle too much, the bread will taste sour. The leaven is not to be prepared of maize flour.

"These experiments further show that Indian meal cannot be kept, and is to be overhauled every day, and therefore, cannot be transported to a great distance. It will be necessary to connect a mill with each bakery.

"Lastly, the difference in price between the two flours is very small, that of Indian corn being $2 75, and that of rye only $3 12; and it is believed it could be obtained at the same price.

"The Police Department is of the opinion that the application of maize flour by bakers may be recommended; but as to the consumption in our prisons, it is not applicable, since the expenses are nearly the same, and the bread of rye is superior in quality and taste."

Rye and potatoes are the food of the common people of Germany;

and, notwithstanding the misapprehensions still existing, as indicated in the Reports here quoted, there are good grounds for hoping that the experiments instituted will not be abandoned, but that success may be attained; and when the prize contended for on the part of this country is nothing less than the interchange of many millions of bushels of corn annually, with the different inhabitants of Germany, for the various commodities they have to export, it is also hoped that the skill and enterprise of American citizens may be efficiently applied to the work of devising means for the safe transhipment of corn, and its preparation in a manner acceptable to the tastes of the people of Germany; for these are the only difficulties presented.

The objects to be achieved, therefore, are the selection of the proper varieties of corn for exportation, the determination of the question as to whether it should be exported whole or ground, the best modes of preparing and putting it up for exportation, and instructing the people of Europe in the methods pursued in this country of making corn-bread, or bread of corn mixed with rye, wheat, or potatoes, and otherwise preparing corn for use as food.

All the varieties of corn, produced to any considerable extent in the United States, are capable of being preserved sweet throughout the year, not only in the regions in which they are severally grown, but in all other portions of the country. It is, however, usually preserved in the grain, and not ground before required for market, or use, as the epidermis, or hull, the least destructible portion, is its natural shield and protector from a damp or vitiated atmosphere. In dry and well-ventilated situations on ship-board, there is no more necessity for the occurrence of decomposition than in similar situations on land. The subject first to receive attention, therefore, is the means of so protecting it on ship-board; and for this the intelligence and energy of private enterprise will no doubt be fully adequate. The use of barrels or sacks, will probably not be dispensed with, because of the necessity of a staid position for such a cargo, and because of the generation of heat from a large bulk of corn in the mass. Special devices for the ventilation of the holds of ships are also worthy of the attention of inventors, with respect to the safe transportation of this as well as of other articles of export and import.

But while all varieties of corn may with proper care be transported with a good degree of security, it may be stated, as the result of ample experience, that those containing much oil, such as the "Golden Sioux," the "King Philip," or "Northern Eight-rowed Yellow," the "Dutton," the "Rhode Island White Flint," &c., are less liable to decomposition than those that contain little or no oil; but that the flour, or meal, made from these sorts, is not so pleasant to the taste, especially of persons unaccustomed to its use, as that made from the soft, farinaceous varieties of the South and West. These, however, may be adapted to safe transportation by means of kiln-drying, a process for which improved facilities will doubtless be devised as soon as an enlarged demand for kiln-dried corn shall indicate a necessity for them. In this process, corn should be subjected to a degree of heat not greater than 212° F., sufficiently long to destroy its germinating power, but not long enough to parch or crisp it so as to impair its sub-

stance or nutritive properties. The length of time proper for retaining it in a place thus heated must depend upon various circumstances; such as its dryness or humidity, when placed there; the openness or compactness of its texture; the size of the chamber or cylinder; the bulk of corn within it; and the quantity of oil contained in the corn, there being generally some appreciable quantity of this element, the "Tuscarora," the "White-flour," and the "Wyandotte" being among the exceptions. It must be stated, however, that kiln-drying impairs the flavor of corn of all kinds; and therefore some means of exporting it safely, without a resort to this process, will continue to be sought, successfully it is hoped.

Mr. Thomas Pearsall, of Smithborough, in New York, assumes that the necessary cause of the fermentation and consequent souring of corn-meal is the action of heat generated within the package upon the moisture always present in some degree, and from which the heat proceeds, and that the centre of the bulk is always first affected in this manner. He has proposed a means of obviating this difficulty, consisting simply of a vertical tin tube, 2¼ or 3 inches in diameter, and open at both ends, which passes through the centre of the barrel. In this manner, a bulk of 18 or 20 inches diameter is reduced to 9 or 10 inches, which is almost equivalent to the separation of the barrel into four sections and the admission of air to the exterior parts of each, or the reduction of a radius of 9 or 10 inches to 4½ or 5 inches; and all this only by the omission of a quantity of meal from the centre which it would require scarcely an appreciable enlargement of the circumference of the barrel to retain.

The grinding of corn into meal, grits, and hommony, and the preparation of these articles for the table, are arts not likely to be acquired from any amount of instruction, however minute, unaccompanied by practical demonstration; and it has therefore been wisely suggested that these operations should be introduced into some of the countries of Europe by American millers, and American domestic bakers. It may be remarked, however, that the common saying is true, that "No kind of grain is *spoiled* by fine grinding, except Indian corn," although wheat may be injured thereby. Corn may be well ground by means of the mill usually employed in grinding wheat, which admits of regulation for the purpose by means of the elevation and depression of the upper stone, the revolving speed being in like manner affected; but mills appropriate for the purpose have also been constructed of cast-iron.

The effort made in Prussia, and which has been herein alluded to, was instituted with the view of manufacturing a merchantable article of bread, made of rye and corn, in the proportion of two parts of the former to one of the latter, for the purpose of making such saving in the cost as the lower price of the corn would insure. Although it is not proposed in this place to enter into a description of the modes of baking and cooking corn in its various forms of preparation, it is proper that the precise case before us should be satisfactorily met.

Delicacies for the table made of corn, with eggs, milk, butter, and cream, are, of course, articles of domestic manufacture. Plain bread,

made with reference to economy, is also, from reasons of economy, manufactured at the family hearth. The wheat and rye bread sold by the bakers of this country is consumed by many who relish it, and by many more to whom it is convenient to purchase it, both classes being indifferent as to the expense. But a fastidious taste, and a desire to be economical, alike induce the home manufacture of bread. Corn-bread, therefore, is seldom sold by the bakers; but, so far as it has obtained a place on their shelves, it has proved acceptable, though made even more economically than was attempted in Prussia.

The "Boston Brown Bread," contains two parts of corn to one of rye-meal, by measurement, and is made in the followng manner: To three quarts of mixed meal are added a gill of molasses, two tea-spoonfuls of salt, one tea-spoonful of salæratus, and either a tea-cupful of home-brewed, or half a tea-cupful of brewer's yeast. This bread continues good and wholesome as long as any other bread is usually kept; but, like all other preparations of corn, it is preferred warm, and is therefore generally eaten fresh, or after being toasted. Like all other kinds of corn-bread, it is an acceptable substitute, not only for the bread made of other grains, but for the vegetables which use has made desirable at the noon-day meal; and it is so used with butter, molasses, soup, or the gravy of meats, which latter is freely absorbed by it, and renders it both palatable and more nutritious.

If it be true, as alleged in the foregoing quotations from the Report of the Department of Police of Prussia, that the difference in the prices of rye and corn is very small, there being a saving of only one-eighth of the price of the rye displaced by the corn, then, so far as that country isconcerned, the market may not be attractive; but when it is remembered that corn-meal is there quoted at 2¾ cents a pound, and that this for a quantity equal in weight to a barrel of flour is $5 50, the American farmer and merchant will both alike conclude that the people of Prussia can be fed with American corn at a much lower rate, and yet afford good profits both to the producer and the exporter. D. J. B.

CHEMICAL ANALYSES OF CORN-COBS.

BY CHARLES T. JACKSON, M. D., OF BOSTON, MASSACHUSETTS.

The following analyses were undertaken with the view of ascertaining how much nutritive matter is contained in the cobs of Indian corn, and also how much of each mineral salt they had extracted from the soil upon which they grew. Never was a more important subject laid before me than the investigation of the chemical nature of the Indian corn-plant, since it concerns the chief agricultural industry of our people. Were as much time and expense devoted to the analyses

of our staple crops, and the soil in which they are cultivated, as there is annually expended on metals and ores, how soon would the farmer reap the advantage of a truly scientific and profitable agriculture. The age demands progress in this science, and I trust that, ere long, complete investigations will be made in the other parts of this valuable plant, as well as in several others among our economical products.

Analysis of the Corn-cob, from the Farm of Thomas Andrews, in Smithfield, Rhode Island.—This corn was produced by admixture of the two varieties, "Canada" and "Red-cap." It was remarkably prolific, with a very small cob, weighing only 124 grains.

The matter soluble in ether, alcohol, and water was found to be in the following proportions: In 100 grains of the ground cob, the whole amount dissolved was, 3.145 grains, or about 3⅛ per cent. of the cob.

	Grains, or per cent. of cob.
A sicative yellow fixed oil, . . .	0.323
Sugar, ...	0.242
Dextrine (gum) and some albumen and extractive,	2.557
	3.122
Loss, . .	0.023
	3.145

The saccharine matter did not crystalise, and probably is identical with grape-sugar, or glucose.

In other samples from the same farm, the relation of the kernels to the cob was first ascertained by shelling several ears, and then weighing both the cobs and the grain. The number of ears to each stalk was four, the weight and increase of two specimens of which were as follows:

First Sample.

Weight of cob, . . .	260	grains.
Weight of kernels, . .	1,970	"
Number of kernels on ear, .	332	
Yield, 1,328 grains to 1.		

Second Sample.

Weight of cob, . . .	280	grains.
Weight of kernel, . .	2,070	"
Number of kernels on ear, .	325	
Yield, 1,300 grains from 1.		

One thousand grains in weight of these cobs, dried at 212° F., and burned in a platinum bowl, left 9½ grains of ash, which, on analysis, was found to consist of the following ingredients:—

Potash,	3.204
Soda,	0.492
Phosphate of lime,	1.000
Phosphate of magnesia,	0.260
Phosphoric acid (from the alkalies)	0.300
Silica,	0.800
Chlorine,	0.196
Per-oxide of iron,	0.360
Unburned charcoal,	1.500
Carbonic acid and loss,	1.388
	9.500

One hundred grains in weight of this corn yielded to ether 4¼ grains of a fat fixed oil; and to alcohol, 4.11 grains of sugar and zeine.

Analysis of the Cob of "Burr's Improved Wrinkled Sweet Corn" (early variety.)—The cob of this corn was short, thick, and quite large in proportion to the depth of the kernels, one of which weighed 307 grains. One hundred grains of this cob, reduced to a fine powder, yielded of matter soluble in ether, alcohol, and boiling water, successively employed, the following proportions, or about 3¾ per cent. of the cob:—

	Grains, or per cent. of cob
Siccative oil,	0.179
Sugar,	0.065
Brown extractive matter,	0.242
Dextrine (gum) and albuminous matter,	3.257
	3.743

Analysis of the Ashes of the Cob of the "Sweet Corn."—A cob, weighing 480 grains was burned in platinum to ashes, which weighed 4.2 grains. These ashes, analysed, produced nearly seven-eighths of one per cent. of the cob, the ingredients of which were as follows:—

	Grains, or per cent. of cob.
Potash,	0.2581
Soda,	0.2104
Silica,	0.1250
Phosphate of lime,	0.0521
Phosphate of magnesia,	0.0279
Oxide of iron,	0.0416
Phosphoric acid,	0.0290
Chlorine,	0.0292
Carbonic acid and coal,	0.0812
	0.8545

Analysis of the Cob of the "Maryland White Southern Corn."—The cob of this corn weighed 290 grains, and was quite short, but not large. When burned, the ash weighed nearly 4 grains, and yielded about 1¾ per cent. of the cob, the ingredients of which were as follows:

	Grains, or per cent. of cob.
Potash,	0.4585
Soda,	0.1211
Silica,	0.1720
Phosphate of lime and magnesia,	0.0800
Oxide of iron,	0.0420
Phosphoric acid,	0.0290
Chlorine,	0.0340
Unburned carbon,	0.2242
Carbonic acid and loss,	0.5872
	1.7480

Analysis of the Cob of "Southern Corn," a Red-colored Variety, grown near Cape May, New Jersey.—The cob weighed 560 grains, and when burned, left 7.6 grains of ashes, which yielded about 1⅜ per cent. of the cob.

	Grains, or per cent. of cob
Potash,	0.450
Soda,	0.220
Silica,	0.103
Phosphate of lime and magnesia,	0.054
Phosphoric acid,	0.091
Chlorine,	0.011
Oxide of iron,	0.032
Unburned carbon and carbonic acid,	0.389
	1.350

Analysis of the Ashes of the "Tuscarora" Corn-cob.—This corn was grown at Long Meadow, on the Connecticut river, in Massachusetts. It is a large-grained corn, very rich in starch. The cob weighed 630 grains. When burned, it gave 12.2 grains of ashes, which yielded, on analysis, nearly 2 per cent. of the cob.

	Grains, or per cent. of cob.
Potash,	0.6430
Soda,	0.1970
Silica,	0.0714
Phosphate of lime and magnesia, and oxide of iron,	0.0800
Phosphoric acid,	0.0800
Chlorine,	0.0630
Unburned carbon,	0.1430
Oxide of iron, carbonic acid, and loss,	0.6590
	1.9364

Analysis of the Cob of "Dutton Corn."—This corn is cultivated in Massachusetts. It has a small yellow kernel and a large cob, weighing 830 grains. Three hundred grains of the dried and powdered

cob yielded, on analysis, of matter soluble in ether, alcohol, and water, about 3¼ per cent. of the cob.

	Grains, or per cent. of cob.
Fixed drying oil,	0.249
Sugar,	0.333
Dextrine (gum), albumen, and astringent extractive matter,	2.700
	3.282

When analysed for inorganic matters, the ash yielded about 1⅜ per cent. of cob, as follows:

	Grains, or per cent. of cob.
Potash,	0.410
Soda,	0.174
Silica,	0.135
Phosphate of lime,	0.042
Phosphate of magnesia,	0.020
Phosphoric acid,	0.023
Oxide of iron,	0.038
Chlorine,	0.049
Unburned carbon,	0.127
Carbonic acid and loss,	0.255
	1.353

It will be observed that there is a considerable variation in the relative proportions of the inorganic constituents, owing probably to the chemical natures of different soils. Potash and soda are the most abundant and important of these principles. The phosphates of lime, magnesia, and of the alkalies are evidently in smaller proportion in the cob than in the grain. Chlorine, originally in the state of chloride of sodium, is observed to be a constant ingredient in the corn-cob, and varies considerably in its relative proportions to the other mineral salts. Silica must have existed in the state of silicate of potassa, and the small proportion of phosphoric acid, separate from lime and magnesia, was combined with the alkalies, potash, or soda.

In order to understand fully the chemical physiology of Indian corn, it will be desirable to analyse the different parts of the plant in its various stages of growth and development, beginning with the germ at the time it is drawing its nourishment from the starch of the grain, changed gradually into dextrine and glucose, and then to make researches on the stalks and leaves anterior to the fructification of the ear, and afterwards when the sugar changes into starch. There is evidently a period when the sugar is in the state of glucose, or grape-sugar, and another when it is mostly cane-sugar. Then comes the conversion of this sugar into starch, in the milky grains, precisely the opposite of the changes observed in germination.

The transfer of the phosphates from the stem to the "chits" of the grain is also a most interesting phenomenon in the plant, and the facts relating to it should be well ascertained. It will be seen, then, that we have but just entered upon the field of chemical research relating to the physiology of the grain; and certainly this is a plant that deserves the special study of American agriculturists, as well as of chemists.

GREEN CORN FOR FODDER.

BY T. C. PETERS, OF DARIEN, NEW YORK.

In many regions of the United States, the high price of land makes it difficult for those who cultivate small farms, to realise profits proportionate to the capital invested. To such persons, in particular, it becomes a desirable object to be able to keep cows in order to enrich their land cheaply, and to derive revenue from the products of the dairy. What is termed "soiling" is, in these cases, of the highest importance.

There is no doubt that at least three animals can be kept in good condition upon the green food cut and fed to them daily from a piece of land that would barely support one, if left to feed thereon, while the manure thus saved, if properly applied, would be more than equal to the cost of the labor involved, without taking into the account the gain in land.

It has been found difficult during hot and dry summers to have a ready and sure supply of green food. Realising this difficulty in feeding teams, two years ago, I made an attempt to supply the defect by sowing Indian corn broadcast; and though the season was unusually hot and dry, the experiment proved successful. Last spring, I accordingly proceeded to the cultivation of corn for that purpose, in a systematic manner.

The ground selected was near my barn, and in good condition, as to heart; and all the preparation I made was to plough it once and then drag it down smooth. As the corn grown in this region is the common "Yellow," I sent to Ohio, and obtained my seed from the large Southern varieties.

On the 2d of June, I set one of Batchelder's corn-planters to drop the hills a foot apart, and then run it backward and forward as near the rows already planted as possible, without actually interfering with them. After planting it in this manner, I gave it a good rolling. It came up finely; I then found that the planter was a decided improvement upon the former modes of sowing corn.

On the 6th of August, I cut an average stalk from one of the hills, when the tassel was just in sight, and found it to weigh 3½ pounds. When subsequently cured, it weighed a pound.

The amount of green food which may thus be grown, under favorable circumstances, seems almost incredible. An acre contains 43,560 square feet. If, therefore, but one such stalk were to grow upon each foot, there would be over 76 tons produced to the acre.

The supply of food thus furnished was beyond all my expectations, and satisfied me that, hereafter, I could in no other manner do so well as to prepare a small lot for planting or sowing corn to feed my teams. I think that any land that will produce 2 tons of hay, will yield 10 tons of corn fodder. I think also that, at the North, the Southern corn will do best for sowing, while, at the South, some of the Northern varieties will grow fully as rank and strong as can be desired.

CONDENSED CORRESPONDENCE.

Statement of J. J. PRATT, *of Centre, Cherokee county, Alabama.*

Corn is justly considered our most important crop. It is easier cultivated, yields more to the acre, and, upon the whole, is a more certain crop than any other. Our river "bottoms" and valley lands are well adapted to its growth. Without manure of any kind, and with our careless management, it will average about 30 bushels to the acre. This year, the maximum yield is 50 or 60 bushels. Two crops of "Early Dutton" corn can be raised on the same land in one season.

In a successful experiment within my knowledge, some corn was gathered from the field on the 27th of July, and on that day, a portion of it was planted in a garden. It fully matured in October. Corn may be planted here any time from the middle of March till the first of July, with a fair prospect for a remunerating return. It is frequently put in after the crop of wheat is removed from the field, and the product is good; but this double cropping is only resorted to in cases of necessity.

Statement of MASTON S. GREGG, *of Fayetteville, Washington county, Arkansas.*

I have my land "deadened" out in July or August three years before clearing. I break the ground well, 8 inches deep, lay off the rows 3½ feet each way, and plant by the 15th of April, an inch deep. As soon as the corn comes up, I run once between the rows with a plough. In ten days after, I run the plough crosswise the rows as near the centre as possible. This furrow drains each hill, and keeps it warm and dry. Cold and wet should be guarded against at this season of the year. The single furrow also keeps the corn from washing down. At the third and fourth ploughings, I run twice between each row, turning the earth from the corn. In the first two ploughings, I would rather have one furrow than two; and in the third and fourth, I would prefer two rather than four. At the fifth ploughing, I run four times between the rows, and then thin out, leaving two stalks to a hill. The great secret in corn-culture is prompt and rapid movement at the proper time. Thorough breaking of the ground, early planting, rapid culture, having it thick on the ground and thin in the hill, are the main points. By observing this system, I get two weeks in advance of my neighbors, avoiding much of the hot weather and the flies, and sparing my horses; and, moreover, I make from 10 to 20 bushels to the acre more than others around me. I cultivate 20 acres every year with my own hands, using a good plough, and hoeing very little. When the season is good, I can, with great ease, produce 100 bushels from each acre on our best "bottom" land.

For ten years past, I have planted the "Polk' corn, which constantly improves. I use only the best ears, discarding the small ends and imperfect grains.

The market price of corn here varies from 25 to 50 cents a bushel.

Statement of GEORGE P. NORRIS, *of New Castle, New Castle county, Delaware.*

Indian corn is the most certain crop raised in this county. The 1st of May, and earlier, if possible, is usually selected as the proper time of planting.

The average yield is 45 bushels to the acre. New corn is worth at the present time, 70 cents a bushel.

Statement of WILLIAM W. WOODBRIDGE, *of Paw Paw Grove, Lee county, Illinois.*

Corn may be regarded as our most valuable crop, 100 bushels being often raised to the acre, including large fields; but 50 bushels may be considered an average crop.

In 1855, it brought more than 60 cents a bushel.

Statement of C. W. BABBITT, *of Metamora, Woodford county, Illinois.*

Indian corn, in this section, is the surest, as well as the most profitable crop we can raise. The following is an account of an experiment made by me the past season:—

The ground on which the corn was raised had been badly cultivated the years previous, and was exceedingly full of the seeds of weeds. The stalks of the preceding year's corn were cut off near the surface but not burnt. The ground was ploughed about 8 or 9 inches deep, as early in the spring as it could be done. Just before planting, it was harrowed lengthwise the furrows, so as not to interfere with the stalks, in order to kill the weeds, which had started. The corn was then planted about 3½ feet apart, with a drill, in the same direction in which it was ploughed. The drill furrowed the ground, dropped the corn, and covered it by one operation, with one kernel to about every 8 inches. A man and a horse planted about 8 acres in a day. Just before the corn came up, the ground was again harrowed in the same direction in which it was ploughed, the teeth of the harrow being only about 3 inches in length. As soon as the corn was up sufficiently high, it was ploughed as near it as possible with a double-shovel scouring plough, going twice between the rows. In the course of the season, the plough was run between the rows a fourth, and, in some cases, a fifth time, but no sensible gain was derived from the latter. No hoe was used, nor scarcely a weed removed, except what was done with the plough; neither had there been applied any manure to the land. The yield was over 50 bushels to the acre,

though the corn suffered much from drought. The corn was then husked, (shucked,) put into rail pens, and covered with straw or long grass, with rails swung across, and hay ropes to protect the covering.

The present price of corn is from 22 to 35 cents a bushel.

Statement of A. J. BOONE, *of Lebanon, Boone county, Indiana.*

The "King Philip" or "Brown" corn, I received from the Patent Office, was planted June 9th, 1855, and harvested September 10th. The hills were 3 by 3 feet apart, and the number of stalks to each hill three. I made no estimate of the yield to the acre, for the reason that I planted but one of the papers of seed that I received; but the yield was far better than I expected. The only value of this corn, with us, is its early maturity for meal, and for table use, while green. Our common varieties far surpass it for fodder and grain. I will try it next year from the seed now grown, hoping that a better season may increase the yield. The ground, where it grew, was a brown, loose soil, on a clayey subsoil, thoroughly ploughed, with a top-dressing of stable manure, and the corn was hoed once.

I planted the "Lee" corn on the same date as the above, and harvested it on the 10th of October. The distance of the hills apart was 3 by 3 feet, and the number of stalks in a hill from three to five. The season was very wet; and even those kinds of corn which were fully acclimatised, did indifferently well. I think a year or two more in this climate and soil will demonstrate that it is a profitable corn for ordinary purposes, the yield being fair, and its maturity in time to escape the autumnal frosts. There are generally two ears on each stalk, and sometimes three. The stalks are large, and from 15 to 16 feet high, with "spur" roots, occasionally, at the third joint from the ground.

Statement of ALEXANDER HERON, *near Connersville, Fayette county, Indiana.*

Corn, as it has never wholly failed, having withstood all the varying seasons of summer and autumn, is the most reliable as well as the most profitable crop with us.

The chief varieties which we cultivate are the "White-water Valley," the "Large Yellow," the "White Piper," and the "White-bread" corn. The usual mode of cultivation is the old method of planting in hills.

The average yield of past season was from 60 to 75 bushels to the acre; the greatest yield 131 bushels. The price at this place is 30 cents a bushel. Cost of transportation to Cincinnati, by canal, 8 cents a bushel, or 15 cents for 100 pounds.

Statement of WILLIAM J. PAYNE, *of Rushville, Rush county, Indiana.*

Our corn-crop, this year, has been remarkably good, yielding from 50 to 80 bushels to the acre. We generally work it four times with a shovel-plough, but never with the hoe.

The present price of corn here is 25 cents per bushel; old corn has been selling for 65 cents.

Statement of G. P. WALKER, *of Hamilton, Decatur county, Iowa.*

I planted the "King Philip" corn, which I received from the Patent Office, in my richest ground, in a very careful manner, on the 9th of May. When the earth became too dry, it was watered. It was fully ripe before the middle of August, and the yield was abundant.

Having distributed this corn liberally among my neighbors, both in Southern Iowa and Northern Missouri, to a distance of 60 miles, I am confident it will be thoroughly tested the present year. We sometimes plant corn in the month of April, though I am satisfied that we ought not to plant, even here, in the sunny side of the State, until, say, from the 10th to the 20th of May.

Statement of BENJAMIN F. ODELL, *of Plumb Spring, Delaware county, Iowa.*

Indian corn is our principal crop, which is planted about the middle of May, in rows 3 feet apart. The average yield is 40 bushels to the acre, worth from 25 to 50 cents a bushel.

The estimated expense of cultivating an acre is as follows:—

Ploughing,	$1 00
Marking out and planting,	1 00
Harrowing twice,	1 00
Hoeing once,	1 50
Ploughing,	75
Harvesting,	1 25
Interest on land,	2 00
Total cost,	8 50
Value of 40 bushels at 35 cents,	14 00
Profit,	5 50

Twenty-five bushels to the acre will pay the cost of cultivation.

Statement of L. E. DUPUY, of *Shelbyville, Shelby county, Kentucky.*

The most valuable staples of our county are corn and blue-grass. On these, we graze and feed all our cattle, hogs, and mules. The average quantity of corn raised by good farmers is about 50 bushels to the acre, but choice fields will yield from 60 to 75 bushels.

The best method of cultivating clover-stubble, or sod-land, is to break it in the fall or winter, and cross-plough in the spring, in each case with two horses, running about 6 inches deep. Between the 15th of April and the 10th of May, harrow over the ground until it becomes smooth and light. With a corn-drill, make the rows from 3½ to 4 feet

apart; drop one grain to each foot in the row; or, what is better, one grain to every 6 inches, and then thin out to a grain to the foot. This is better than the hill method, with three or four grains to a hill, as it gives each stalk sufficient room to spread its roots. As soon as the corn is up a few inches, we run a harrow over it with the front teeth out, and have a boy follow and uncover all that may need it. A week afterwards, we go over it with a shovel-plough, and follow with a hoe, to exterminate all the weeds left. In about ten days, we go over it again with a cultivator, which will level down the furrow, and enable us to follow close to the corn with the shovel-plough; and finally we finish with the cultivator, in order that, at last, the ground may be left level, to prevent washing.

This process makes the cultivation cost about $4 to the acre, with interest on the value of the land; making the whole cost $8 an acre. The produce of 50 bushels is worth in the field from 20 to 25 cents a bushel. We sell but little corn, and export none. It is fed to cattle, hogs, mules, &c., and, in this way, brings us, in beef and pork, from $15 to $25 per acre, according to the value of the animals fed and the care and attention bestowed in feeding them.

Statement of EDWARD STABLER, *of Harewood, Montgomery county, Maryland.*

The "Wyandotte" is certainly the most prolific corn I have ever grown, and in some localities may prove very valuable. I received it from Illinois, paying a cent a grain for twenty-five grains, that being the market price. It was not planted until late in May; but, as the fall was seasonable, it ripened tolerably well. Each grain had a separate hill, and those which escaped the cut-worm and fowls, produced from three to five strong stalks, averaging from 8 to 10 feet in height, and usually with from one to two ears to the stalk; thus yielding from four to eight ears from each grain planted.

There are two strong objections to making this a crop corn in this latitude: It is certainly much later in ripening than our yellow varieties, when cultivated under similar circumstances, though, if planted early, it might mature well; but the greatest objection in field culture, is its liability to fall after a soaking rain, on account of its single root and great weight of stalk and ears. For table use, I think it will prove valuable, either in summer, or for putting up in cans for winter use, being very succulent and almost as white as starch.

Statement of WILLIAM HADSELL, *of Hancock, Berkshire county, Massachusetts.*

I planted the "King Philip" or "Brown" corn, I received from the Patent Office, on the 20th of May, on a dark, rich, loamy soil, that had a heavy top-dressing. The hills were 4 feet by 2 apart, and four kernels planted to each hill. There were two hundred and seventy-six kernels, which made sixty-nine hills. The worms destroyed

at least ten hills, and we had the longest drought that has occurred in five years, which affected the corn very much. But, under all these disadvantages, I picked, on the 1st of September, 3 bushels of ears of very fine corn. The ears were of good size, and the kernels quite large. I think this corn is well adapted to our latitude.

I planted a number of varieties of corn the past season, but none yielded so much as the King Philip.

Statement of RICHARD C. STONE, *of Sherborn, Middlesex county, Massachusetts.*

I planted the "Improved King Philip" corn on the 20th of May, on a rich, dark, and rather moist soil, which, for five years previous, had been cropped with carrots. It was not what we consider good land, but I had no other where it would not certainly mix with other corn. I put no manure in the hill, nor on the land. The first part of the season was wet; the latter, quite dry. The corn matured fast, and ripened early, and measured by weight from 50 to 60 bushels to the acre. The ears are of medium length and well filled, the kernel large, the cob small, and there were frequently two ears to a stalk. I consider it a superior kind for high latitudes.

I have preserved this corn, as requested, and am giving it in small quantities to those who will test it in our farming community.

Statement of THOMAS O. JACKSON, *of Plymouth, Plymouth county, Massachusetts.*

I send you four ears of the Plymouth "Smutty-white" corn. I planted an acre on the 12th of May, 1854, topped it August 31st, and harvested October 3d. The distance of the hills apart was 3½ by 3½ feet, and the number of stalks to a hill four.

The yield of dried shelled corn was 60 bushels to the acre. Had it not been for the drought, it would have been 80 bushels. The weight per bushel, of dried grain, was 60 pounds. The number of pounds of dried ears required for a bushel of grain was 76. About 2 tons of fodder were obtained. Of manure, 4½ cords were put in the hills.

Statement of E. A. HOLMAN, *of Harvard, Worcester county, Massachusetts.*

Corn is one of the most remunerating products with us. The maximum yield is 96 bushels to the acre; average 37; the smallest yield that will pay expenses, 16 bushels when guano is used as a fertiliser. Average cost per bushel, 75 cents.

Statement of C. S. G. CLIFTON, *of Greene county, Mississippi.*

Indian corn is the best crop cultivated in this county. In some instances, that planted from the 20th of March to the 1st of April

succeeds best. Our best lands will yield from 40 to 50 bushels to the acre.

The price is generally $1 per bushel.

Statement of SAMUEL J. FLETCHER, *near Winchester, Clarke county, Missouri.*

Indian corn is the principal crop with us. On prairie "bottom" land, the yield is from 60 to 100 bushels to the acre.

The price of corn here is from 30 to 40 cents a bushel

Statement of WILLIAM B. GIDDINGS, *of Middle Grove, Monroe county, Missouri.*

Corn is the crop we cultivate to the best advantage in this county, as but little care is required to raise it. The maximum yield is 100 bushels to the acre; average, 40 bushels. Twenty bushels to the acre will pay expenses of cultivation.

Corn is worth at the heap 15 cents a bushel.

Statement of ALTON H. HIBBER, *of Creve Cœur, St. Louis county, Missouri.*

I plant corn from the 20th of April, to the middle of May, in rows 4 feet each way, leaving two or three stalks to the hill. I commence working early, with a heavy two-horse harrow, till the corn gets too large. I then use a steel mould-board plough, running deep, and throwing the soil from the corn and to it, each way, ploughing four or five times.

I never fail to get from 40 to 100 bushels to the acre.

Statement of JOHN BROWN, *of Long Island, near Lake Village, Belknap county, Lake Winnipisiogee, New Hampshire.*

A majority of our farmers content themselves with raising 25 or 30 bushels of corn to the acre, and are hard to be made to believe that any more can be produced. They go on in the old way, planting the rows 4 feet apart, and the hills 3 feet asunder, putting from four to six kernels in the hill, and after the blades get a fine start, and the roots spread in all directions, instead of going to work, as they should do, with a hoe, and giving it a light brushing, to stir the ground and keep the weeds down, they take a horse and cultivator, or plough, and cut off half the roots, and by making a mound, or hill, give the corn a check from which it never recovers. Managing in this way, no farmer should expect a large crop of corn, even from ground well manured.

When I went to farming in 1817, I was hoeing my corn about the 1st of July, and making a hill, as all farmers then did. The ground

was not weedy, but I found that I was cutting off a great many rootlets. It struck me that I was hurting the corn by making the hill; and from that instant, I left off making hills around my corn, and have since that time left the ground as smooth as possible.

After making several experiments, as to the distance that the hills should be planted apart, I made one, in the year 1836, which I have taken as a guide ever since, and which I believe to be the best. The experiment was to plant the rows 3 feet apart, and the hills in the row 2 feet from each other, and not have more than three plants growing in a hill, thinning them out at the first hoeing.

I have a variety of corn, apparently fixed in its character, which sometimes bears my name (Brown corn.) See Patent Office Report for 1853, page 111.

About one-half of my corn, the past season, was planted on ground on which potatoes grew the year before; the other half on land newly broken up, the whole well manured and ploughed in. That part, where the potatoes were raised the year before, was much the best, almost doubling that planted on the sward land. One acre yielded 7,200 pounds of ears, which were weighed, when carried into the corn-house. I shelled 70 pounds of ears, and they produced 2 quarts over a bushel, which makes a fraction over 109 bushels of shelled corn to the acre.

The cost of labor, including drawing the manure, to the acre, amounted to $28; seed and interest on the land $4, making $32. Fifteen cords of barnyard manure were used on the acre, and, estimating it at the highest price, $4 a cord, it would be worth $60. Now, suppose we get one-third of the strength of the manure the first year, it would cost $20. And, reckoning the fodder to be equal to 2 tons of hay, it would bring $20, just equal to what the manure exhausted, so that the whole cost of raising 109 bushels of corn was only $32.

The corn was harvested the last of October, and was in good order to grind. If I had spread the 15 cords of manure on 2 acres, I should have got, according to former experiments, made in a favorable season, 50 bushels to the acre, and the labor would have been double, except drawing the manure and harvesting; and the expense of raising would have been equal to 54 cents a bushel, while the cost the present year was only 29 cents a bushel.

Statement of MOODY MARSHALL, *of East Weare, Hillsborough county, New Hampshire.*

I received from the Patent Office, last spring, two hundred and eighty-three kernels of the "King Philip" or "Brown" corn, which I planted 3½ feet apart. The season was quite unfavorable. Of the kernels planted, twenty-six were destroyed by worms; but, from the remaining two hundred and fifty-seven, there was a yield of 71 pounds.

I think this the best corn for this climate I have ever tried. It does not require to be planted so early as to expose it to the spring frosts, and it will ripen before the usual time of frost in the fall.

Statement of H. G. STONE, *of West Boscawen, Merrimack county, New Hampshire.*

Indian corn is our most important and reliable crop. The "Improved King Philip," or "Winnipiseogee corn," is a beautiful eight-rowed variety, yielding well, and is suitable for our climate.

The common yield is from 25 to 50 bushels to the acre, although in favorable seasons, with high culture, much more is obtained.

Statement of D. R. STILLMAN, *of Alfred centre, Alleghany county, New York.*

Indian corn is not very extensively cultivated in this section, though nearly every farmer produces some. The varieties most raised are the "Eight-rowed yellow," and the "Twelve-rowed Dutton." It is planted from the 10th to the 20th of May, in hills 3 feet apart each way, with four plants to a hill. It is cultivated or hoed twice, cut up at harvest time close to the ground, and the shocks cured as soon as the leaves begin to turn, or before they are injured by frost. The maximum yield is 100 bushels to the acre; the average, 30 or 40 bushels; and 20 bushels to the acre is as small a yield as will pay expenses.

Corn sells here at 75 cents a bushel. Cost of raising, 40 cents

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Statement of J. H. WRIGHT, *of New Haven, Oswego county, New York.*

I planted the "King Philip" or "Brown" corn, I received from the Patent Office, on the 20th of May. It was fit to harvest in September. All who reside in this vicinity say that it ripens at least two weeks earlier than other field corn, which is a matter of much importance in this high latitude; and it is also very productive, many of the stalks having two good long ears, with large kernels and small cobs.

Statement of PETER CRAMER, *of Middle Granville, Washington county, New York.*

I followed the directions sent with the "King Philip" or "Brown" corn, and, notwithstanding the severe drought, I raised from one rod of ground at the rate of 102 bushels to the acre, while the corn on each side of it did not yield half a crop, or over 30 bushels to the acre. It was planted on a dry and slaty soil, and received neither extra culture nor manure.

Statement of JOHN P. HALLER, *of Lima, Allen county, Ohio.*

The average yield of Indian corn to the acre, in this section, is about 40 bushels; though, with proper cultivation, from 100 to 125 bushels

can be raised. The past season, a farmer in this vicinity raised 116 bushels to the acre at a cost of $5 15.

The "Improved King Philip" or "Brown" corn will mature here in about ten weeks, while other varieties require nearly four months.

The price of corn is 35 cents a bushel.

Statement of W. D. LINDSLEY, *of Sandusky City, Erie county, Ohio.*

On the 21st of April last, I planted 2 acres with "White Gourd-seed" corn, the hills about 4 feet apart and four kernels to a hill. The soil was composed of a mixture of clay and sand, of a reddish color, and was well adapted either for wheat or corn. The crop was cultivated the usual way, and was harvested on the 1st of October. The yield was 148 bushels of ears to the acre.

On other parts of my farm, I planted, in drills, the same kind of corn, with a seed-planter, which drops the kernels on an average of 8 or 10 inches apart. This mode of planting, I consider an improvement over the old method, as it is a great saving of labor, while the yield is much more than when planted 4 feet apart. A man can plant by this method from 10 to 12 acres in a day. In order to be successful in the mode of planting, it is necessary to commence the cultivation as soon after the corn is up as it can be distinctly seen in the rows.

Last season was unusually cold and wet in this section, and corn was very slow in its vegetation, as well as in its growth and maturity. I continued planting from the 21st of April until the 7th of June. That last planted did not ripen before the coming of frost, and when it first came up, it was much injured by the "cut-worm," an insect which destroys annually hundreds of acres of corn in this vicinity, especially that which is planted in May or June. Seventy-five acres of my land, I planted in April, and not one hill of it was destroyed by the worm. Of this land, 10 acres were oat stubble; 12 of new land; and 3 acres of old meadow, which had been broken up the previous fall. The sward-land, ploughed in the fall and spring, and not planted before May or June, was completely infested with the cut-worm, and acres of corn-plants were destroyed in a single night. I am of the opinion that the only way of avoiding its attacks, is to plant as early in April as practicable, in order that the corn may become large and tough before it makes its appearance. It generally attacks the corn about forty-eight hours after the corn is up, and seldom, if ever, meddles with the plant after four leaves are formed, as it is then unsuited to its taste.

Statement of J. WOODSIDES, *of Marion county, Oregon.*

Indian corn, in this county, from becoming acclimatised, or from some other cause, grows much better than it did formerly, and is receiving the increased attention of our farmers. I have not much doubt that we shall be able soon to cultivate it with success and advantage.

Statement of JOHN F. BENNETT, *of Pittsburg, Alleghany county, Pennsylvania.*

About two years ago, I obtained from the Patent Office two ears of "New Mexican White-flint" corn, which I planted in the spring of 1854, and received a fair yield, notwithstanding the unfavorableness of the season by drought. Last spring, I planted 4 acres from the seed produced the year before, which has also yielded a fair crop.

Statement of JAMES MCK. SNODGRASS, *of Mifflin, Alleghany county, Pennsylvania.*

Corn, next to wheat, is our most valuable crop. The best mode of raising it is to plough and subsoil a pasture or meadow lot, in winter or early spring, to the depth of 12 or 15 inches; then harrow thoroughly, and mark out in rows 3½ feet apart, each way, dropping four or five grains in a hill; then use the cultivator, or double-shovel plough, freely, so as to keep down the grass and weeds, and cause the soil to be loose around the hills. It should be thinned out so as to have not more than three stalks to each hill. The greatest yield to the acre is 115 bushels; the average yield but 45 bushels of shelled corn. The price is 55 cents per bushel.

Statement of D. MINIS, *of Beaver Plain, Beaver county, Pennsylvania.*

The average yield of corn, in this section, the last season, was about 30 bushels to the acre. By giving the ground 20 cords of manure, the yield would have been double.

The cost of cultivating an acre of corn here is about $9.

Statement of RICHARD LECHNOR, *of Stouchburg, Berks county, Pennsylvania.*

Next in importance to wheat, in this section, is the cultivation of Indian corn. There are many varieties planted, which are designated by local names. The "Yellow," however, is much preferred, generally containing a red cob, with from fourteen to twenty rows. The yield the past season was rather above an average, being upwards of 50 bushels to the acre, though not unfrequently twice that amount has been raised.

The following is an account of the manner of cultivating this staple: First, a Timothy or clover sward, which has been mown for several successive years, is selected. This is well ploughed in the fall of the year, to a depth of 6 or 8 inches. Fall-ploughing is preferred, as it gives ample time for the decomposition of all vegetable ingredients contained in the soil, which are turned under by the plough. In the spring of the year, about the end of March, the surface of the ground is well stirred with the harrow and cultivator, in order to prevent an early growth of weeds. Early in April, the land is marked off into furrows about 3½ feet apart, and the corn dropped in, either singly, leaving an intervening space of about 15 inches, or in hills,

3½ feet apart, and four kernels to a hill. As soon as the corn has grown to the height of 4 inches, plaster is applied; the ground is then stirred with the cultivator, and afterwards with the shovel-plough; subsequently, it is suckered.

The following is the estimated cost of cultivating an acre of corn:

Interest on land,	$6 00
Ploughing,	2 00
Dressing with harrow and cultivator,	1 00
Marking out and planting,	1 10
Seed and plaster,	1 30
Passing through with cultivator,	1 12½
Passing through with shovel-plough,	1 62½
Cutting up, shocking, and husking,	3 00
Shelling and conveying to market,	5 00
Tax,	35
Total cost,	22 50

The yield upon an average may be estimated at 50 bushels to an acre, which will give a cost of 45 cents a bushel. The average market price here is about 80 cents a bushel, which will give a net profit of 35 cents to a bushel.

Statement of GEORGE M. WASSON, *of Cedar Springs, Clinton county, Pennsylvania.*

I select a clover sod of at least one year's standing, and early in March sow a bushel of fine-ground plaster to each acre; I then plough about 8 inches deep as early as possible. About the end of April, I harrow well, and mark out the ground 3½ feet apart each way, from 1 to 2 inches deep. I plant, the first week in May, 3 or 4 grains to a hill, with about a table-spoonful of plaster to each. As soon as the corn is 2 or 3 inches high, I pass between the rows with a one-horse cultivator, and, a few days later, again crosswise with the same implement, making use of about a table-spoonful of plaster to each hill. My reason for sowing the plaster on the ground before planting is to cause a more rapid decomposition of the refuse clover trampled down the previous year by the farm stock.

I plant the "Red-cob Peg" corn, and raise on an average 60 bushels of shelled corn to the acre.

Statement of NATHANIEL GREEN, *near Middletown, Newport county, Rhode Island.*

Indian corn is one of the most reliable and profitable crops that can be raised upon this island, especially since the failure of the potato. A wider space is given to the corn, however, and more manure is applied to the land than formerly. It was usual in former times to plant 3½ feet apart each way, leaving four stalks in the hill to stand; but since the introduction of the corn-planter, it is dropped 3 feet apart between the rows, and from 2 to 2½ feet asunder along the rows, particularly by those who use the cultivator.

Barnyard and hog manure are in general use, and are sometimes mixed with menhaden fish. The farms in the vicinity of the sea are partially manured with sea-weed, rock-weed, and beach sand. Four or five cords of manure are usually spread broadcast, and ploughed under, to the acre, on sward land, when intended for corn, as it is obtained from September to the time of ploughing, which is generally done the latter part of April; though some farmers continue the old-fashioned mode of manuring lightly in the hill, or ploughing a portion of it under when sown broadcast.

The average yield of corn to the acre is about 45 bushels, although the produce is sometimes as high as 100 bushels to the acre. The cost of raising is not less than 50 cents a bushel.

The price of corn delivered at the mills, is from $1 to $1 25 a bushel.

Statement of ROBERT W. BAYLOR, *of Wood End, near Charlestown, Jefferson county, Virginia.*

Indian corn is the most profitable crop we cultivate. The maximum yield is 100 bushels to the acre; the average crop, 40 bushels to the acre. Twenty-five bushels, at 50 cents a bushel, will pay the expense of cultivation.

The cost of transportation to Baltimore, 100 miles, by railroad, is 14 cents a bushel; to Georgetown, in the District of Columbia, 80 miles, by canal, 6¼ cents a bushel.

Statement of JAMES E. KENDALL, *of Poplar Grove, Kanawha county, Virginia.*

Corn is cultivated here more than any other crop. The average yield is about 40 bushels to the acre. The cost of raising, 20 cents a bushel.

The market price is usually 50 cents a bushel.

WHEAT.

THE PRODUCTION OF NEW VARIETIES BY CROSS-FECUNDATION.

The terms "mule," "hybrid," "half-breed" and "cross-breed" are vaguely and indiscriminately used by many writers; but it is essential to accuracy that more precise distinctions should be observed. The offspring of two animals of different species is a *mule*, and is seldom endowed with the procreative power, and still more rarely with a long-continued succession. The product of two plants of different species is a *hybrid*, and although it is in general more prosperous than the mule of animals, it is still destined to yield at length to the beneficent law of Nature, which ordains that neither among animals

nor vegetables shall the distinctions of species be obliterated. The permanent divisions among plants of the same species, often called "varieties," are properly *proles*, or races. The product of two individuals of the same species, but of different races, is a *variety*, as is every modification of this, effected by cross-fecundation with any other variety, or with any of the races of its species.

Great advantages have been found to proceed from the practice of cross-fecundation, in the extraordinary improvement effected in the flowers, esculent vegetables, and fruits of almost every country. That the Cereals have only to a limited extent shared these advantages is a subject of just surprise to the curious inquirer; but, until very recently, it was doubted that much, if anything, could be accomplished in regard to them. Professor Gærtner, of Stuttgart, who has been said to have almost exhausted the subject in certain points of view, has declared the Cereals to be "among the plants least favorable to cross-fecundation." In 1851, however, prize medals were awarded at the Industrial Exhibition, in London, to Mr. B. Maund, and to Mr. H. Raynbird, of the United Kingdom, for their respective collections of "hybrid Cerealia." In their award, the jurors speak of the process, not as impracticable, but merely as being difficult, in consequence of the care requisite in removing the unexpanded anthers from one plant, and applying the pollen of another, and subsequently guarding them from the attacks of birds, insects, and other disturbing influences.

Mr. Maund experimented with "Cone" wheat, which contains much gluten, in the hope that by crossing it with a race containing more starch, he might obtain a whiter quality of equal value; but it is not stated that he was wholly successful. Mr. Raynbird commenced his experiments in 1846, with the "Hopetoun," a white wheat, of long ear and straw, and fine grain, and "Piper's Thickset," a coarse red wheat, with thick, clustered ears, a stiff straw, and very prolific, but liable to mildew. Mr. Maund enumerates eight instances in which successful cross-fecundation had taken place, as follows:—

1. *Male.*—Old Lammas. / *Female.*—Donna Maria. } A much larger ear than either.
2. *Male.*—Pearl White. / *Female.*—Oxford Red. } Ditto.
3. *Male.*—Clustered Red. / *Female.*—Satin White. } A coarse, rough, short-eared sort.
4. *Male.*—Old Lammas. / *Female.*—King's White. } A very large long ear.
5. *Male.*—Boston Red, / *Female.*—Donna Maria. } Large ear, and very strong straw
6. *Male.*—White Cone (hairy.) / *Female.*—Northumberland Red (smooth) } A long, beardless ear, rather downy.
7. *Male.*—Dark Cone. / *Female.*—Pearl? } A small, deformed ear, white, tinged with black.
8. A parcel of anomalous forms, all instances of deterioration.

Mr. Maund found, as a general rule, in the cross-fecundation of wheat, that a strong male and a weak female produced a better result than a weak male and a strong female. The specimens of deterioration, under No. 8, are all of this character.

The entire feasibleness of the production of new varieties of wheat by cross-fecundation, and its great desirableness, being thus established, it is not doubted that many intelligent agriculturists of the United States will be willing to institute further experiments for the purpose of developing improved varieties, or such as shall be found peculiarly adapted to the soil, climate, or demands of particular sections of the country; and, for their guidance, a few practical suggestions will here be given.

New varieties thus produced resemble both parents, but seldom in an equal degree. In successful experiments, they are usually of earlier development than either parent, more prolific, and better adapted to withstand cold and drought. A late plant of an early, and an early plant of a late race, may be made to produce early, late and intermediate varieties. Sometimes, when the first cross is not good, a mixture between it and one of the parent races, or even a second or third cross of this nature, may result in the desired quality. Two races, which do not cross freely, may also find a medium of union in a third. Again, a race that will not readily receive, will often freely impart impregnation.

In every perfect head of wheat, there are, during the blooming season, both male and female organs of reproduction, three stamens and one pistil. The stamens, or male organs, shoot out beyond the

The letter *a*, denotes a longitudinal section of the stalk, including a joint; *b*, a detached leaf, one-third the natural size; *c*, a head of wheat in flower, somewhat reduced; *d*, the entire organs of reproduction enlarged; *e*, a side view of the berry, or grain, showing the embryo, or germ; *f*, a partial vertical and transverse section, exhibiting all the parts of a grain, with the embryo, magnified.

chaff, or calyx, each having an anther suspended by a fine thread, as indicated in the preceding engraving.

The three males are designed to impregnate the stigma of the one female, or pistil, which is situated in the centre of the anthers. From these anthers, a powder, or pollen, is emitted, which adheres to, or is absorbed by, the stigma, and is conveyed by it down to the berry, or seed, at its base, and thus effects the work of fecundation. So decided is the preference of the pistil for the pollen of its own stamens, that it is often impossible to impregnate it with that of any other head, while a particle of this is near. Impregnation takes place best when the weather is dry and warm, as a peculiar warmth and a certain electric state of the atmosphere prepare the parts for this process, which always occurs on a dry day. The opinion, indeed, has been expressed that the pollen of the male conveys hydrogen to the ovules of the female, that oxygen is received from the atmosphere, and carbon, in the form of carbonic acid gas, from the roots, and that when the pollen is destroyed by the rain, or from any other cause, the carbon alone is found in the ear, and that this is the well known "smut" in wheat. That pollen of the stamen is essential to impregnation is at least certain; and it is almost as certain, from what has been stated, that the total destruction of the reproductive power of a particular race of wheat must be effected before the influence of another can be felt. Two races being placed together, therefore, a cross can only be certainly effected by clipping the anthers from all the stamens of one variety, and leaving the work of impregnation to be effected by those of the other exclusively. This may be securely done by any person capable of distinguishing between the two races; but, perhaps, the safer guide to this distinction consists in sowing the two in separate drills very near each other, say 9 or 10 inches apart; and, to render the work still more sure, there should be no other growing wheat within at least a quarter of a mile of that experimented upon, the affinity between the pollen and the ovules being of almost incredible force. A series of experiments can only be made, therefore, by the coöperation of several experimenters, or of a few occupying farms of considerable magnitude; yet they ought to be conducted according to a plan of perfect unity of design.

If it should be proposed to make a trial with ten races of wheat, for instance, a series of ninety experiments, in as many isolated situations, would be required, as it is necessary to match the male with the female of each race. Let us suppose the following to be the races selected:—

No. 1. White Tuscan wheat.
2. Tuscan straw-hat wheat.
3. Large white soft Tuscan wheat.
4. Red Tuscan wheat.
5. Italian Brenta wheat.
6. Turkish flint-wheat.
7. White Turkish wheat.
8. American Soule wheat.
9. Algerian flint-wheat.
10. White Polish wheat.

The combinations in pairs would be as indicated in the following table:—

Male. Fm'le.	M. F.	M. F.	M. F.	M. F.	M. F.	M. F.	M. F.	M. F
No. 1 and 2 2 and 1	No. 2 and 3 3 and 2	No. 3 and 4 4 and 3	No. 4 and 5 5 and 4	No. 5 and 6 6 and 5	No. 6 and 7 7 and 6	No. 7 and 8 8 and 7	No. 8 and 9 9 and 8	No. 9 and 10 10 and 9
1 and 3 3 and 1	2 and 4 4 and 2	3 and 5 5 and 3	4 and 6 6 and 4	5 and 7 7 and 5	6 and 8 8 and 6	7 and 9 9 and 7	8 and 10 10 and 8	
1 and 4 4 and 1	2 and 5 5 and 2	3 and 6 6 and 3	4 and 7 7 and 4	5 and 8 8 and 5	6 and 9 9 and 6	7 and 10 10 and 7		
1 and 5 5 and 1	2 and 6 6 and 2	3 and 7 7 and 3	4 and 8 8 and 4	5 and 9 9 and 5	6 and 10 10 and 6			
1 and 6 6 and 1	2 and 7 7 and 2	3 and 8 8 and 3	4 and 9 9 and 4	5 and 10 10 and 5				
1 and 7 7 and 1	2 and 8 8 and 2	3 and 9 9 and 3	4 and 10 10 and 4					
1 and 8 8 and 1	2 and 9 9 and 2	3 and 10 10 and 3						
1 and 9 9 and 1	2 and 10 10 and 2							
1 and 10 10 and 1								

Having selected perfect seeds of two races, and fixed upon a locality suitable for the purpose of an experiment, at least six drills should be made, about 10 inches apart, and the seeds of each race deposited in the earth, particular care being observed to remember in which of the drills each race is sown. A wooden label may be fixed at the ends of each drill, and, lest these should be defaced or removed, a drawn plan of the group should be preserved.

The following diagrams may serve to aid the experimenter in his first efforts, the purpose being to impregnate the female of No. 2, with the pollen of the male of No. 1, and *vice versâ*, M denoting male, and F female:—

No. 1.	*M*M*M*M*M*M*M	No. 2.	*M*M*M*M*M*M*M
2.	*F *F *F*F *F *F	1.	*F * F*F*F*F *F
1.	M*M*M*M*M*M*M	2.	*M*M*M*M*M*M*M
2.	F* F *F* F* F*F	1.	*F * F *F*F*F*F
1.	M*M*M*M*M*M*M	2.	*M*M*M*M*M*M*M
2.	F * F*F* F*F*F	1.	*F * F*F*F * F*F

Experiments with No 1 and 2 in alternate drills, 9 inches apart.

Experiments with No. 1 and 2, in *quincuncem*, 9 inches apart.

Watchful care should then be taken to protect the patches or drills from disturbance by vermin or fowls, while still in the ground, and afterwards from insects and birds. The use of gauze nets would be by no means superfluous, from the moment that the heads begin to form. As soon as the anthers show their first rudiments, in a race upon which the cross is to be made, they should be carefully removed, or clipped with a pair of sharp scissors, leaving the female organs undisturbed. Thus both races would be impregnated with the pollen of one. When matured, the utmost care should be taken to gather the seeds of the crossed race by itself.

It will also be curious to observe the difference between the products of the two experiments with the same races of wheat, for instance, of the male of No. 1 with the female of No. 2, and the male of No. 2 with the female of No. 1; for, from the superior influence of the one sex over the other, upon the characteristics of the joint product, if of uniform result, may be inferred something of proof upon a point still involved in controversy, though we now have the light thrown upon the subject by Mr. Maund.

Our country possesses great advantages for the prosecution of experiments of this kind; first, in the very large farm which a single individual often owns and cultivates; secondly, in the intervention of forests, or considerable distances, between the different wheat-fields; and thirdly, in the facility with which experiments may be conducted, according to any prescribed mode, by the members of State, County or other Agricultural Societies.

Such experiments would not involve the expenditure of any considerable amount of time, labor, nor money, while the benefits to the country would be great, and the advantages and honor of achieving success would be gratifying in the extreme. D. J. B.

ON THE SELECTION, CHANGE, PREPARATION, AND SOWING OF WHEAT-SEED.

In the cultivation of wheat, the first object is to obtain clean, dry seed, of large or small, flinty or soft, white or dark grain, according to the soil and climate in which it is intended to grow, newly threshed, if possible, even if one or more years old, and steep it in some liquid that has the power of destroying the spores of parasitical fungi, which, although invisible to the naked eye, may still be present in sufficient quantities to produce "black-ball," or "smut," in the succeeding crop.

In respect to the age of the seed, Theophrastus says, and after him Pliny, it is best when a year old; if kept two years, it is not so good; if three years old, it is still worse, and if older than that, it will not grow. This opinion appears to have prevailed from the days of the Romans in Spain and Italy down to the present time, and the same practice is sedulously adhered to by the farmers in those countries, as well as in Spanish America, whenever attention is paid to this species of culture, who aver that old wheat-seed is not so liable to mildew or

blight as new; whereas, on the other hand, it has been conjectured that their success may be owing to early sowing, inasmuch as new wheat cannot conveniently be obtained in season, and consequently has to be sown late.

"For seed," continues Pliny, "you should choose the fullest ears, having the fullest berry, and set them apart in the barn, and by no means admit those ears that are not well filled throughout, as in such grains there is danger of producing like ears." But let it be remembered that this rule was intended to apply to the Roman Empire, where wheat was almost invariably sown in the fall, and where the soil was naturally fertile, or otherwise made rich. On the contrary, many of the farmers of Europe choose the smallest and leanest grains for their poor land, acting on the premises that a large plump berry contains a sufficient amount of elementary matter to send forth more "tillers" than an indifferent or meagre soil can maintain, which, in the end, must starve or die. It is better, they say, in this case, that small seeds should be sown, in order that they may bring fewer tillers, which can be well fed and sustained. Whatever mode, however, may be adopted, whether by liming, brining, or otherwise soaking or preparing the seed, it is of much consequence, and the first point to be gained is to get good roots to the plants; for, although the ground may be poor, the larger and fairer the grains strike their roots, the greater the depth or compass they will draw their nourishment.

There is also believed to be great benefits derived from changing seed, not only from one climate to another, but to a different soil. For instance, it is a noted fact that the further north wheat can be made to grow, the shorter is the period of time in which it comes to maturity. It has also been observed, when wheat is grown in the extreme north, if used as seed in a southern country, it gives its first product more speedily, ripening in a much shorter time, although, in sowing the seed of that product the second year, it loses this quality. Advantage has been taken of this circumstance in Sweden, in annually bringing their wheat-seed from Torneo, at the north of the Gulf of Bothnia, almost within the arctic circle, and sowing it in lands so much exposed to the cold that ordinary wheat, from the shortness of the season, scarcely has time to ripen. By these means, the lands in that country, which were formerly so utterly barren, are now rendered fruitful. Again, the wheat brought from near the shores of the Mediterranean, to many parts of the United States, not only succeeds well, but possesses the property the first year of ripening some days earlier than the ordinary sorts, and thereby often escapes injury from the ravages of insects or the rust, besides the advantage to be gained from an early market. But whether this change is produced wholly from the difference of climate, or from a deviation in the character of the soil, is at present unknown. From numerous experiments made in England, within the last hundred years, it would appear that "plants, like animals, affect to be nourished by a variety of food," which would tend to show that it is not so much the change of climate that occasions these alterations, as in the change of soil. A case is recorded of a farm in England, on which one field had a clay bottom, another a loam, a third a gravel, and the fourth a chalk.

These gave the occupant the opportunity of changing the seed of his wheat every year, who confined himself only to two sorts, the "Red Lammas" and the "Pirks." When he sowed his Lammas on the clayey soil one year, the next he sowed the seed of the product of the same seed on gravel or chalk, which, though not truly the proper soils for this variety of wheat, yet it proved no impediment to its growth, as he seldom failed to obtain a good crop. In a similar manner, he used the Pirk wheat, a variety which grew well in any of the four soils.

In reference to the change of wheat from one climate to another, there are numerous facts on record in connection with which there appear to have been some phenomena, that were as inexplainable as they were opposite in their effects. As instances, it may be stated that one of the companions of Columbus, 362 years ago, made the first attempt to cultivate wheat in America, whose experiment was attended with the most satisfactory result. The seed was introduced directly from the west of Spain, without any intermediate acclimatisation, to the settlement of Isabella, on the north side of St. Domingo, in latitude about 19° 58' N. "On the 30th of March, 1494," says the historian, "a husbandman brought to Columbus ears of wheat which had been sown in the latter part of January." Wheat has also been brought from England, and sown in various parts of the West Indies, both with and without success, particularly in the Bahamas, Antigua, and Barbadoes; but, as failure to an equal extent was the result of experiments with wheat, the growth of warmer climates, as Sicily, Poonah, &c., and as the temperature of the cycle of wheat varies little from the mean temperature of the cooler months in the West Indies, I should be inclined to look for some other cause of failure than the mere abruptness of introduction. It may be asked, why the experiment of 1494, made with the wheat introduced directly from Spain, should have succeeded so fully, while even "Talavera" wheat, the produce of the same part of Spain, and "Poonah" wheat, the produce of the elevated, but hot district in India, adjoining Bombay, should have wholly or partially failed in 1840? The "Victoria" wheat, produced from Caracas seed, sown in England, retained its native properties unaltered by the change of climate, and succeeded in the West Indies, as well as that introduced directly from the region adjacent to La Victoria and San Mateo. Again, Humboldt, in the fourth volume of his "Personal Narrative," says that "the finest harvests of Egypt and the kingdom of Algiers, and those of the valleys of Aragua and the interior of the island of Cuba, sufficiently prove that the augmentation of heat is not prejudicial to the harvest of wheat, unless it is attended with an excess of moisture or drought. To this circumstance, no doubt, we must attribute the apparent anomalies experienced in wheat-culture in the torrid zone. We are astonished, says the same author, to see to the east of Havana, in the famous district of Quatro Villas (the wheat region) this limit descends almost to the level of the ocean; while, to the west of Havana, on the slope of the mountains of Mexico and Xalapa, at a height of 4,312 feet above the level of the sea, the luxuriance of vegetation is such that wheat does not form ears."

It may here be remarked, that experiments like the preceding are valuable as far as they go, but they should be received with caution, as many other circumstances should be taken into consideration before they can be adopted as conclusive. If, in addition to the particulars referred to above, chemical analyses of the soils, on which the wheat was cultivated, as well as of the manures employed, had been given; if the nature and yield of previous crops had been stated; and, if the mean temperature and extremes of heat and cold in each month of the year had been recorded, together with the amount of rain and snow, sunshine and shade, force of the wind, and the occurrence of early and late frosts, we would then have had elements by which to judge of the accuracy of these results.

Wheat, in this country, as well as in some parts of Europe, is subject to the "black-ball," or "smut." It is no guarantee against this intruder to employ seed which may have been entirely free from it during its growth. For the spores of the fungus which produces it, for aught we know, may be lurking about in the barns or stacks, or even in the air itself, and thus be brought into contact with the seed employed. When the wheat is in the green ear, the smutty ones may be discovered as they stand, but they are more readily observed, when nearer maturity, by rubbing the diseased heads, when a black powder will fly out, emitting a disagreeable smell. This disease in wheat sometimes happens only on one side of the ear, while the other parts appear to remain perfectly sound. A case is on record in which the west sides of the ears of a whole field were affected with smut, while their opposite sides were free throughout. "Smutty grains," says Tull, "will not grow, for they turn to a black powder; but, when some of these are in a crop, then, to be sure, many of the rest are infected, and the disease will show itself, if the year wherein it is planted prove a wet one."

The following are a few of the most reliable modes that are employed in Europe in getting rid of this troublesome pest: Metzger, of Germany, after a trial of 22 years, found only one single injured ear in all his crops, by mixing the seed with soap-suds and slacked-lime. The wheat was prepared three days before it was sown, or until it began to germinate. He says: "If sown earlier after mixing with the lime, it will be liable to smut."

Morton, in his "Cyclopedia of Agriculture," a recent English publication, considered as the highest authority, says: "The old agricultural pharmacopœia gave chamber-lye and caustic lime as the grand recipe for the destruction of the black-ball, and sometimes washing with salt and water was recommended. Both plans might mitigate the evil, but neither of them ever prevented it. Fortunately, sulphate of copper (blue-stone, or blue vitriol) was thought of, and there can be but one opinion as to the perfect efficacy, when properly applied." The quantity generally used in pickling new wheat is 1½ pounds of blue-stone, dissolved in 2 gallons of hot water, which is sufficient to prepare 8 bushels, the liquid being allowed to cool before sprinkling it on the wheat. There is little risk of injuring the seed by an overdose, as half a pound of blue-stone has been applied to a bushel without injury to the seed. Old wheat can also be pickled

with perfect safety with blue-stone—a thing that never can be done without great danger, when chamber-lye, or salt and water and lime, are employed. The quantity of blue-stone for old dry wheat never need exceed 1½ pounds to each 8 bushels, but 2½ or 3 gallons of water are necessary for saturating the seed.

The mode of pickling wheat with blue-stone is exceedingly simple, and this of itself is a great recommendation in its favor, even although it were not more efficacious than the older methods of pickling; but, when simplicity and efficacy are united, there is no excuse for any farmer who may still obstinately stick to imperfect and obsolete practices. All that is necessary, in pickling with blue-stone, is to dissolve it in hot water in the proportions before stated; then spread out the wheat about 6 inches thick, on a stone floor, sprinkle the pickle equally over it, and mix thoroughly with shovels until the wheat has acquired a uniform degree of dampness. It will be ready for sowing in the course of two or three hours, but it is better to have the pickling done a day before sowing. Many farmers pickle the whole of their seed wheat at once, and let it lie for years before sowing, not only without injury, but with evident advantage; the blue-stone thus appearing to possess the power of defending the germ against atmospheric influences, while, at the same time, rats and mice will not touch wheat so pickled, unless greatly pinched for food.

According to Cato, cold wet land should be sown early with fall or winter wheat, and warmer or drier ground reserved to be sown late, which is confirmed by Palladius, who says, in his calendar for September: "In this month, in wet, barren and cold ground, and in places shaded from the sun, wheat should be sown in clear, serene weather, about the time of the equinox, in order that the roots may have time to grow strong before winter sets in." And Columella cites as an old saying, proverbial among the Roman farmers: "Early sowings often deceive—late, never," which leads us to infer that, such places as are naturally cold should be sown first, and those which are warm and dry, last. These expressions, let it be remembered, are purely Southern, and apply to the warmer parts of Italy and Spain, but would not answer for the Middle and Northern portions of the United States.

In Italy, they sow their wheat on heavy and strong lands in September and October, which, as well as November and December, are drier than January and February; therefore, such lands may be expected to work better, as the casting of the seed into a warm, dry bed, especially if the ground be cold, is of great consequence, whatever weather may afterwards occur. Nor are the Italians less judious in sowing their drier lands in January and February, when they are naturally watered by warm and copious rains.

In the middle and colder parts of the United States, where the land is cold, stiff and strong, wheat is found to do best when sown late in August or early in September, which enables the roots to get a good start and better resist the winter's cold; but if the ground be warm, dry and rich, the time of sowing may be prolonged fully a month.

Summer or spring wheats may be cultivated only in those districts where the winter varieties will not bear exposure to hard frost and

long-remaining snow; or where it will not thrive on account of too little summer's warmth. In those regions in which winter wheat will thrive, the summer varieties only prosper where there is frequent and sufficient rain; in dry and hot climates and seasons, they will not succeed. They require the same kinds of soil as winter wheat, but more manure, or, at least, a larger quantity of humus, or vegetable mould. They must be sown as early as practicable in the spring, in order that they may have time to tiller before the heat of summer; they must also be sown thicker than winter wheat, as the produce is universally less, and they are more liable to smut and rust.

As to the quantity of wheat which may be sown to the acre, it should vary according to the quality of the ground, the nature of the climate, the period of sowing, the variety cultivated, and the mode of committing the seed to the earth. Therefore, the proportion of seed that is necessary must depend upon the above-named circumstances and local experience. As a general rule, when sown broadcast on good land, in the fall, the quantity will not vary far from 2 bushels to the acre; but when the sowing takes place very early in the spring, the quantity may even be increased to 3 bushels. Where the "drill" or "dibble" system of culture is practised, considerably less seed may suffice D. J. B.

CONDENSED CORRESPONDENCE.

Statement of J. J. PRATT, *of Centre, Cherokee county, Alabama.*

Wheat, in this region, is second only in importance to Indian corn, without additional manure, with the exception of a little cotton-seed which is sometimes thrown on the "galled" spots in the field. It is usually sown broadcast at the rate of about a bushel to the acre, from the 1st of October to December, and covered with a shovel-plough.

Our main harvest is from the 1st to the 15th of June. We use the old-fashioned scythe-cradle. After it is cut, it is shocked in dozens, in the field, where it generally stands till the corn harvest is over, about the middle of July, when it is threshed by horse-power. The average yield, this year, is from 15 to 20 bushels to the acre; but, in some instances, it has been as high as 40 or 50 bushels.

Our nearest market is Rome, in Georgia. The cost of transportation, by steamboat, up the Coosa, is 5 cents a bushel; by wagons, from 20 to 30 cents. Price at Rome, from 90 cents to $1 25 a bushel, of 60 pounds.

Statement of J. D. MORLEY, *of Lagrange, Stanislaus county, California.*

Wheat is extensively cultivated in this county with fair profit. The most common mode of culture is, to plough in December, January, and February, and sow on the top of the ground, and harrow in forthwith; but this enables the birds, which are very numerous, to get much of the seed. Many of the farmers sow too little seed, and that not of the best variety. But we have no rain after the first of May until the last of November or the first of December; or, at least, not enough to benefit the crop. Much of the grain is affected by the smut. I plough in March and April, and let the ground lie fallow until November, and then sow from 1½ to 2 bushels to the acre, when I plough it in or use the cultivator. After this, I go over the ground with a heavy roller, which is of great advantage; when the grain is ankle high, if it has not jointed.

The best variety is the "White Chili." The time of harvest is the last of May or first of June, and the average quantity per acre is 25 bushels. One acre of wheat, sown in fallow ground, is equal to two, sown in the manner first described. The yield in favorable seasons varies from 15 to 16 bushels to the acre.

In the fall of 1853, wheat was worth here from 6 to 8 cents a pound; in that of 1854, from 5 to 6 cents; in the spring of 1855, from 3 to 4½ cents; and in the fall and winter of the same year, from 4 to 6½ cents a pound.

Statement of GEORGE P. NORRIS, *of Newcastle, Newcastle county, Delaware.*

The recent high prices of grain have induced the farmers of this county to sow more wheat than usual. Much of the land planted with corn last year, is now sown with wheat, which we sow about the 20th of September, and manure with guano at the rate of 300 pounds to the acre. I am of the opinion that when early sown, it does the best. The "Mediterranean" is generally used for seed, and certainly answers well. Our farmers in general use drills.

The present price of wheat at the Brandywine Mills, is $2 10 a bushel. It has been as low, however, as $1 55 the past year.

Statement of WM. W. WOODBRIDGE, *of Paw Paw Grove, Lee county, Illinois.*

The varieties of wheat raised in this vicinity are the "Black Sea" and the "Red Canada club." If properly put in, the average yield is 25 bushels per acre. Fall or winter wheat is not much raised.

The price, since the harvest of 1855, has been from $1 to $1 40 per bushel.

Statement of C. W. BABBITT, *of Metamora, Woodford county, Illinois.*

Fall wheat is so liable to be winter-killed in this vicinity, that but little of it is cultivated. Spring wheat is only moderately grown; the "Italian" and the "Black Sea" varieties are the two principal kinds sown, and yield about 15 bushels to the acre. All wheat here is subject to blight, rust, and smut, though good management much lessons the liabilities to the last two evils.

Wheat has been selling the present season from 75 cents to $1 15 a bushel. Spring wheat brings about 15 per cent. less than the winter varieties.

Statement of ALEXANDER HERON, *near Connersville, Fayette county, Indiana.*

Wheat has been cultivated in this region the past season to more advantage than any other crop, proving the most abundant yield ever known, ranging from 25 to 30, and, in some instances, as high as 40 bushels to the acre. For some years past, it has been a very uncertain crop with us, being liable to be killed by the severe winter frosts, or injured by the weevil and rust. The principal varieties cultivated are the "Mediterranean" and the "Genesee," the former being preferred.

Our best crops of wheat the last season were raised on a clover sod, ploughed under the fall preceding, and sown broadcast at the rate of 2 bushels to the acre, and then harrowed in. They were harvested the first week in July. Estimating the expense of seed, cultivation, and harvesting at $8, a yield of 30 bushels to the acre, at $1 50 per bushel, the price at our home market, the net profit would be $37 to the acre.

Our wheat is all manufactured into flour near home. The cost of transportation to Cincinnati is 25 cents a barrel.

Statement of WILLIAM J. PAYNE, *near Rushville, Rush county, Indiana.*

The product of wheat, this year, is uncommonly good in this section. We generally sow among standing corn, covering it with a shovel-plough, without manure. I have heard of but one field that has yielded less than 20 bushels to the acre. An inverted clover sod, or stable manure spread broadcast, produces the greatest yield.

The present price of wheat is $1 10 a bushel, against $1 90 last year.

Statement of BENJAMINE F. ODELL, *of Plum Spring, Delaware county, Iowa.*

Next to Indian corn, wheat is our most important crop. Spring wheat is the only variety we raise. The average yield is about 15

bushels to the acre, valued at $1 a bushel. The cost of raising and sending to market is about $9 an acre.

The following is the expense of raising 11 acres in 1855, sown on sod-land broken up the preceding year:—

Dragging once with two yoke of oxen,	$3 00
Seed, 16 bushels,	16 00
Sowing,	75
Dragging twice with one yoke of oxen,	2 50
Harvesting,	17 50
Hauling and stacking,	6 00
Threshing,	12 00
Rent of land at $2 an acre,	22 00
Total,	79 75
Yield 82½ bushels at $1,	82 50
Profit on 11 acres,	2 75

Only about 7 acres were harvested, the remainder being "hazel-brush" land, which was choked down by weeds. It is a notable fact, that this class of land, last year, did not yield with us more than half a crop.

Statement of O. H. KELLY, *of Northwood, Benton county, Minnesota.*

The "Saumer" spring-wheat, which I procured from the Patent Office last season, succeeded well. It ripened about the 1st of September. Should it maintain its character for hardiness and yield next year, I shall continue to cultivate it.

Statement of SAMUEL J. FLETCHER, *near Winchester, Clarke county, Missouri.*

In the cultivation of wheat, I plough from 8 to 12 inches deep, running over once with a large harrow, when the ground is rough; then sow broadcast 2 bushels to the acre; harrow twice, lengthwise, and across the furrow, afterwards passing over the field with a two-horse roller. My average yield is from 25 to 40 bushels to the acre. This year, I raised on a field of 10 acres, of the "White Blue-stem," about 400 bushels, while the average crop in this region was only from 7 to 12 bushels to an acre.

In 1853, I obtained from Baltimore 2 bushels of "White Blue-stem" wheat, and 2 bushels each of "Australian" and "Gale's Early-flint." From the Blue-stem I harvested 38½ bushels of fine wheat, while both the others were perfect failures. They were all sown at one time, and in the same field.

The price of wheat last year varied from $1 10 to $1 50 a bushel. The best flour is worth $9 50 a barrel.

Statement of DANIEL PATERSON, *of Fayette, Howard county, Missouri.*

Wheat here is sown in the fall, and yields about 20 bushels to the acre.

Price, $1 25 a bushel; cost of conveyance to market 15 cents a bushel.

Statement of D. R. STILLMAN, *of Alfred Centre, Alleghany county, New York.*

Wheat is but little cultivated for market in this section of the State. The spring varieties succeed best, and are sown as early as the ground will admit, at the rate of 1½ to 2 bushels to the acre. It is harvested about the 1st of August, and yields from 10 to 30 bushels to the acre, or an average of about 15 bushels.

The price this season has been $2 a bushel, or 75 cents more than is usual.

Statement of GERSHOM WIBORN, *of Victor, Ontario county, New York.*

This county, up to within a few years, was considered one of the best wheat-growing regions in the country; our farmers producing, in favorable seasons, from 15 to 35 bushels to the acre; but latterly, there has been a great falling off in their crops, so much so that they begin seriously to talk of discontinuing its cultivation. The reason assigned for this falling off is attributed to winter-killing in unfavorable seasons. Fields that lie bare of snow, and take the dry cold winds of winter, have entirely failed, and those which escape are generally injured by the wheat-midge and the Hessian fly.

Our most reliable wheat-lands are either dry, level fields, or such as have an inclination to the south or east, or those which are protected from the northwestern winds by high ridges, or dense woods.

We have never much practised raising spring wheat here. A few attempts have been made, but they have mostly failed. For the most part, we sow the "Soule" wheat, but the "Mediterranean" has of late come much into favor. It seems to do better upon some land than the Soule wheat; and, as it is earlier in ripening, it is less liable to be injured by the midge. Its flour, however, is vastly inferior to that of the Soule.

Statement of JOHN P. HALLER, *of Lima, Allen county, Ohio.*

This was a considerable wheat-growing county until the red weevil made its appearance. The "Mediterranean" variety does best, as it is not so liable to be destroyed by this insect. Winter wheat should be sown here from the 1st to the 20th of September. The yield is about 15 bushels to the acre, valued at $1 37 a bushel.

For several years past, the wheat-crop has been much injured by the red weevil. In some cases it has been an almost entire failure. The past season, it was but little injured, owing probably to the cool weather which occurred about the time they commenced their ravages.

Statement of WILLIAM H. GOUDY, *of Buteville, Marion county, Oregon Territory.*

Wheat is, and perhaps will be, the chief staple in Oregon. The finest crops are raised on the fresh prairie sod, broken in May and June, and sown in the September following. Those who have old farms, plough their land in the spring and the early part of summer, and sow in the fall. In either case, from 30 to 50 bushels may be raised to the acre. The old French settlers plough their land in February and sow their seed. In this way, they raise good wheat year, after year, on the same land. The quantity of seed sown is from 1¼ to 1½ bushels to the acre. The cost of raising is 60 cents a bushel.

The kinds raised are the "White Winter" wheat, the "Bald," and two varieties of spring wheat, one a white chaff and bald, the other a red chaff and bearded. There is also some of the "Egyptian" wheat here, which excels all other varieties. One of my neighbors planted three small heads, last season, in a bed in his garden, from which he raised a gallon of clean wheat. Some of the stalks were 8 feet high.

Wheat is worth here at present $1 a bushel.

Statement of MATHEW HALL, *of Alleghany county, Pennsylvania.*

Wheat is raised to the best advantage in this section. Our mode of cultivating is to spread barnyard manure on sward-land, put the field in corn or oats, and then take two succeeding crops of wheat. After breaking up a field, we generally take three crops from it, and then clover is seeded, allowing it to remain from three to five years without breaking up, according to the size of the farm.

The "Mediterranean" variety is preferred by a majority of our farmers, on account of its early maturity and comparative freedom from the ravages of the fly. I consider the "Club-head" and "Blue-stem" better varieties than the Mediterranean. The wheat is of a finer quality, and yields about a fourth more to the acre, but is subject to the fly or weevil. The Blue-stem is a small white wheat, and is superior in quality to any other variety grown in this region. The Club-head is a red, smooth wheat. These varieties are of stronger growth, and are not so apt to lodge, as beardy or Mediterranean wheat.

The maximum yield is between 45 and 50 bushels to the acre, but the average is about 18 bushels.

Statement of JAMES MCK. SNODGRASS, *of Mifflin, Alleghany county, Pennsylvania.*

Wheat is raised to a considerable extent in this county, much land being well adapted to its culture. There are different varieties in use here, such as the "Mediterranean," "Blue-stem," "Golden-straw," and others known by local names. The Blue-stem and Mediterranean are most esteemed, on account of their ripening early, and being less subject to rust.

The best mode of raising wheat is to break up clover sod, from 8 to 10 inches deep, about the 1st of September; harrow it until it becomes well pulverised, and then drill in the seed from the 15th to the 25th of the same month. If White wheat is sown, 5 pecks of seed are employed to the acre; and if Mediterranean, 6 pecks. By drilling, we get from 4 to 5 bushels more per acre than by sowing broadcast. The greatest yield is 45 bushels to the acre; the average yield 20 bushels. The usual mode of harvesting is with the cradle. The reaping machine is not yet in general use, but, when employed on level or slightly rolling land, it appears to give satisfaction.

Statement of C. SNIVELY, *of Penn Township, Alleghany county, Pennsylvania.*

The average yield of wheat in this county is 14 bushels to the acre. When it is less than 8 bushels to the acre, it will not pay.

The varieties chiefly grown are the "White Blue-stem" and the "Mediterranean." They both mature early, and are therefore more apt to escape rust, and the midge, which, for several years past, has somewhat injured the crops in this county. Our method of cultivation is to break up in August or September a clover or Timothy sod, and then sow. Timothy seed is sown for hay or pasture with the wheat, and the following spring clover is sown at the rate of half a peck to the acre. Grain drills are rapidly coming into use. They save time and labor, as well as seed. When we sow wheat broadcast, we put in from 1¼ to 2 bushels to the acre. When drilled in, 1½ bushel is amply sufficient, and the yield is greater. The time for sowing is from the 10th until the last of September.

The price of wheat the last year was from $1 65 to $1 75 per bushel. At the present time, (April, 1856,) it is from $1 to $1 10 per bushel.

The cost of transportation to Philadelphia, by railroad, is 30 cents a bushel; by canal, somewhat less.

Statement of D. MINIS, *of Beaver Plain, Beaver county, Pennsylvania.*

The wheat-crop, in this section, last season, was unusually good, although it was somewhat injured by the wet weather. The latter circumstance, however, may be an advantage to some of our farmers hereafter, by inducing them to shock their grain with more care.

The best remedy for the fly, is, to have the wheat ground in good condition, and sow from the 20th of September to the 5th of October, in this latitude. If sown earlier, the fly deposits her eggs on the plants; they immediately hatch, and the larvæ perform their work of destruction in the fall; but if sown later, they do not hatch before spring, and the larvæ, or worms, then commit their ravages. If sown at the above-named period, the young broods of flies are hatched in the fall, but are too feeble to withstand the winter's cold, and perish.

The average yield of wheat, with us, the past season, did not exceed

especially the Mediterranean of this year, (1855,) which, with us, was very indifferent.

This wheat, I suppose, would weigh 55 pounds to the bushel. The ground in which it was cultivated was first-rate wheat land, heavily and recently manured, and deeply worked. The yield was at the rate of 45 bushels to the acre. The head was bearded, and very long; and I think it probable that after becoming acclimatised, it would be valuable in this section.

RYE.

CONDENSED CORRESPONDENCE.

Statement of JAMES MCK. SNODGRASS, *of Mifflin, Alleghany county, Pennsylvania.*

There are considerable quantities of rye raised in this county. It is usually sown after wheat. Some of it is ground into flour, which commands a ready sale and a fair price. The rest is distilled. Thirty bushels to the acre is regarded as a fair yield.

The average price is 70 cents a bushel.

Statement of RICHARD LECHNOR, *of Stouchburg, Berks county, Pennsylvania.*

Rye, with us, at present, is mostly cultivated in patches on wheat fields, principally for its straw, but is not so much grown as formerly. The quantity usually sown to an acre is 1½ bushels.

The ordinary yield is 24 bushels to the acre, worth from 80 cents to $1 a bushel.

BARLEY.

ECONOMICAL USE AS FOOD FOR HORSES.

The value of barley, in one form or other, as an article of use, has acquired in some countries a factitious importance from its easy convertibility into malt and spirituous liquors; but, viewing it simply as an article of diet for man, it must be assigned a lower position than wheat, oats, c

In an e iew, the grain of barley, when boiled, long rope as a mash for horses after a hard

cart to each acre about 35 two-horse loads of manure from the barn-yard, spread it evenly over the ground, and plough it under as soon as possible, so as to prevent the moisture from being dried out by the sun and air. I plough from 6 to 8 inches deep, and harrow immediately. About the 10th of September, I plough again, about the same depth as at first, for the purpose of mixing the manure and earth properly together. I sow broadcast, from 1¾ to 2 bushels to the acre; and about the 10th of April, or sooner, I sow about a peck and a half of plaster to the acre.

I cultivate the "Bald-white Blue-stem" wheat. My average crop for many years, under this mode of culture, has been 30 bushels to the acre, weighing 63 pounds to the bushel. I regard late sowing as the best preventive of the ravages of the Hessian fly.

Statement of JOSEPH PARKER, *of West Rupert, Bennington county, Vermont.*

But little wheat is sown in this county, except the spring varieties. That known as the "China" wheat, has been the most productive; the yield the past season being 20 bushels to the acre, worth $2 50 a bushel.

I received from the Patent Office, last spring, a small package of "Algerian" wheat, which I sowed on the 21st of March. It vegetated early, and ripened the usual time of spring wheat; it produced well, having a large berry. It will well remunerate the effort of cultivating it, as it appears to be hardy, with large heads and a long heavy beard.

Statement of ROBERT W. BAYLOR, *of Wood End, near Charlestown, Jefferson county, Virginia.*

The maximum yield of wheat in this county is 37 bushels to the acre; the average crop, 15 bushels. Twelve bushels, at $1 a bushel, will pay expenses.

The cost of transportation to Baltimore, 100 miles, by railroad, is 14 cents a bushel; to Georgetown, in the District of Columbia, 80 miles, by canal, 6¼ cents a bushel.

Statement of MATHEW HARRISON, *of Leesburg, Loudoun county, Virginia.*

The President of our Agricultural Society gave me a few papers of spring "Tea" wheat, from the Patent Office, containing altogether about half a pint. I sowed half of it on the 9th, and the residue on the 10th of March last, in drills a foot apart. The entire space occupied by the wheat was 7 feet wide by 35 feet long. I cut the crop on the 18th of July—seven moderate-sized bundles—three from the sown first, and four larger from the latter. I obtained a peck of wheat from my crop. The grain had undergone some change. The seed I sowed was like rye in color, very dark and small; that which I gathered, was larger, not so dark, and more like the Mediterranean,

especially the Mediterranean of this year, (1855,) which, with us, was very indifferent.

This wheat, I suppose, would weigh 55 pounds to the bushel. The ground in which it was cultivated was first-rate wheat land, heavily and recently manured, and deeply worked. The yield was at the rate of 45 bushels to the acre. The head was bearded, and very long; and I think it probable that after becoming acclimatised, it would be valuable in this section.

RYE.

CONDENSED CORRESPONDENCE.

Statement of JAMES MCK. SNODGRASS, *of Mifflin, Alleghany county, Pennsylvania.*

There are considerable quantities of rye raised in this county. It is usually sown after wheat. Some of it is ground into flour, which commands a ready sale and a fair price. The rest is distilled. Thirty bushels to the acre is regarded as a fair yield.

The average price is 70 cents a bushel.

Statement of RICHARD LECHNOR, *of Stouchburg, Berks county, Pennsylvania.*

Rye, with us, at present, is mostly cultivated in patches on wheat fields, principally for its straw, but is not so much grown as formerly. The quantity usually sown to an acre is 1½ bushels.

The ordinary yield is 24 bushels to the acre, worth from 80 cents to $1 a bushel.

BARLEY.

ECONOMICAL USE AS FOOD FOR HORSES.

The value of barley, in one form or other, as an article of use, has acquired in some countries a factitious importance from its easy convertibility into malt and spirituous liquors; but, viewing it simply as an article of diet for man, it must be assigned a lower position than wheat, oats, or Indian corn.

In an economical point of view, the grain of barley, when boiled, has long been employed in Europe as a mash for horses after a hard

day's work, or when unwell, acting as a gentle aperient, as well as a sudorific, opening the system and softening the skin. In Egypt, as also in all parts of the East, it has been used in an uncooked state from time immemorial, as the common food of horses, where the use of rye and oats is unknown. However prejudiced farmers may be against it, as horse food, from the belief that it is too heating to those animals, when kept hard at work, they cannot avoid being convinced of its excellence, in this respect, when they consider that in the countries where they are the most remarkable for their good qualities, as well as for their beauty, they eat no other kind of grain.

Barley, when fed to horses in a half-malted state, is said to be perfectly harmless, however highly heated they may be, irrespective of the quantity they may eat. The only preparation it requires for their purpose, is to soak it in water for twelve or twenty-four hours, after which it may be fed to the animals in the usual way. D. J. B.

CONDENSED CORRESPONDENCE.

Statement of GERSHOM WIBORN, *of Victor, Ontario county, New York.*

Barley is raised here to some extent, and makes a good substantial food, when ground, for fattening cattle and swine, as well as for working oxen and horses. It requires a rich, warm, loose soil, and one that will not suffer much from drought. Our usual practice is to break up a clover lay in the fall, and sow the seed in the spring; then, as soon as the crop is harvested, say, about the middle of July, the stubble is ploughed under, and the ground re-sown in September with wheat. When, harvested, it is stacked like hay—first mown with the scythe, and then raked into windrows, cocked, and stacked. The yield is from 15 to 30 bushels to the acre.

The price of barley in this region varies from 50 cents to $1 a bushel.

Statement of NATHANIEL GREEN, *near Middletown, Newport county, Rhode Island.*

Barley is rather an uncertain crop with us, and but little is cultivated. When it escapes the "maggot," or worm in the straw, it generally succeeds well, and is as profitable to raise as any other grain. Formerly, it was the most remunerating grain-crop raised on this island.

OATS.

CONDENSED CORRESPONDENCE.

Statement of J. J. PRATT, *of Centre, Cherokee county, Alabama.*

Oats are a valuable crop with us. Our land seems well adapted to their culture. The time of sowing is from the first of February to the last of March, and this generally on land which has been planted with cotton or corn. The amount of seed to the acre is from 1 to 2 bushels. The time of harvesting is about the 1st of July. They are usually consumed on the farm or sold in the neighborhood in the sheaf, or are threshed out in the spring for seed.

The price in the sheaf is from 15 to 20 cents per dozen, or from 40 to 50 cents a bushel, when threshed.

Statement of GEORGE P. NORRIS, *of Newcastle, Newcastle county, Delaware.*

Oats, with us, are usually sown as early in the spring as the ground can be prepared, at the rate of 2½ bushels to the acre. Two hundred pounds of guano to the acre are usually applied, and this is considered a fair dressing.

The price of oats is 43 cents a bushel.

Statement of D. R. STILLMAN, *of Alfred Centre, Alleghany county, New York.*

Oats are the most extensively cultivated in this county of any of our tilled crops. They are sown broadcast from the 15th of April to the 1st of June, at the rate of 3 bushels to the acre. The maximum yield to the acre is about 60 bushels; average 30 bushels, and 12 bushels is as little as will pay the expense of cultivation, which is about 25 cents a bushel.

The market value of oats here is 37½ cents a bushel; cost of transportation to New York, by railroad, 14 cents a bushel.

Statement of GERSHOM WIBORN, *of Victor, Ontario county, New York.*

Oats are cultivated in this section to an almost unlimited extent, and I have raised them for some years at a profit. The yield is from 50 to 70 bushels to the acre, and they sell from 40 to 60 cents a bushel.

Statement of JOHN P. HALLER, *of Lima, Allen county, Ohio.*

Large quantities of oats have been raised in this county the past season, the average yield being about 35 bushels to the acre, worth 20 cents a bushel.

Statement of WILLIAM H. GOUDY, *of Buteville, Marion county, Oregon Territory.*

Oats are extensively cultivated here, as food for horses and oxen. They are sown in April, on land broken the previous fall, and ploughed again in the spring. The quantity of seed sown varies from 1½ to 2 bushels to the acre. The average yield is 40 bushels, though 80 bushels are often raised in this way.

Statement of JAMES MCK. SNODGRASS, *of Mifflin, Alleghany county, Pennsylvania.*

Oats, with us, are raised by almost every farmer, and are in general use as food for horses. When sown early, they yield well; but they are regarded as an exhausting crop. They are generally sown after corn. The average yield is 50 bushels to the acre.

The price is 28 cents a bushel.

Statement of D. MINIS, *of Beaver Plain, Beaver county, Pennsylvania.*

Oats, in this section, are cultivated on almost every farm, for home feed or for sale. The average yield to the acre is about 30 bushels, although as high as 88 bushels have been raised.

The cost of production of an acre of oats, in this county, is about $7. They sell for 25 cents a bushel.

Statement of RICHARD LECHNOR, *of Stouchburg, Berks county, Pennsylvania.*

Oats are extensively cultivated here, and are considered a remunerating crop. The sowing is performed as early in the spring as the ground will admit, at the rate of 3 bushels to the acre.

The yield is from 40 to 50 bushels to the acre. The average market price is 45 cents a bushel.

Statement of JOHN BOYD, *of Parkersburgh, Chester county, Pennsylvania.*

From a small parcel of Egyptian oats, obtained from the Patent Office, a few years since, I increased my stock to 18 bushels, which I sowed last spring on 6 acres of ground of middling quality. The result of the crop was 240 bushels, which, when well cleaned, weighed 40 pounds to a bushel.

Another good feature in these oats is that the straw is stiff and firm, which renders it less liable to fall before harvesting.

Statement of NATHANIEL GREEN, *near Middletown, Newport county, Rhode Island.*

Oats, on this island, are generally sown on land which has been planted with corn the preceding year, and are considered a remunerating crop. About 3 bushels are sown to the acre. The average yield is 45 bushels, although 80 bushels to the acre are sometimes raised. The cost of production is about 20 cents a bushel. They are generally threshed by machines at 4 cents a bushel.

The price of oats, delivered at Newport, is from 50 to 60 cents a bushel.

Statement of AUGUSTUS ELLIOTT, *of San Francisco, San Francisco county, California.*

In 1847, Mr. R. P. Tucker, a farmer near the head of Napa Valley, discovered six stalks of oats, which he supposed had grown from seed dropped by some bird. The year following, he sowed the grain they had produced, and came near losing them, as they barely matured. The next year, (1849,) he raised from the product about a quart of oats. From these, he obtained a bushel, in 1850, which were distributed among the farmers in that vicinity, who now cultivate no other oats. It is estimated that there were cultivated, in 1856, 30,000 bushels in the county of Napa alone.

The height of these oats was 8 feet, at least a yard taller than those ordinarily cultivated here. The straw, though large, still is fine for fodder. The yield is about 50 bushels to the acre, weighing from 40 to 50 pounds to the bushel.

BUCKWHEAT.

CONDENSED CORRESPONDENCE.

Statement of D. R. STILLMAN, *of Alfred Centre, Alleghany county, New York.*

Buckwheat is extensively cultivated in this county. The variety principally raised is known as the "Scotch grey," and is sown from the 15th of June to the 10th of July, at the rate of a bushel to the acre. The maximum yield per acre is 50 bushels; average, 25 bushels; and 12 bushels to the acre will pay for cultivation. It can be raised for 25 cents a bushel.

The past season, they have been sold from $1 to $1 50 a bushel, though the usual price has been from 62½ to 75 cents. Cost of transportation, by railroad, to New York, 22 cents a bushel.

Statement of GERSHOM WIBORN, *of Victor, Ontario county, New York.*

Buckwheat, sometimes, is very successfully cultivated here, but, at others, it is almost an entire failure; hence it is considered a rather uncertain crop. In a good season, it will produce from 15 to 30 bushels to the acre, but an early frost or a few days of hot weather, blasts the husbandman's hopes. It is sown about the first of July, and harvested the last of September.

Buckwheat flour, in limited quantities, sells for near the same price as that of wheat.

POTATOES.

PROPAGATION OF NEW VARITIES FROM SEED.

BY C. E. GOODRICH, OF UTICA, NEW YORK.

The following are directions for cultivating new varieties of potatoes from seed. Although they would seem to be easy, from my experience, but few persons would exercise the patience and watchfulness necessary to carry them into execution.

Previous to sowing, soak the seeds in lukewarm water, six or eight hours; pour off the water; then mix them with sand or fine earth, to give them body, so that they may be sown thinly and evenly. Sow in as clean ground as possible, or you will lose them in weeding. Cover lightly, and press the earth upon the seeds, marking the exact place of the rows very accurately. The seeds, if well saved, are very sure, but slow in sprouting. The young plants will be fit to weed, the first time, in from three to four weeks. Sow different sorts separately, and give the whole ground of your bed to them.

Sow, in this region, the middle of April; but earlier further south. Transplant in six weeks. The plants are as hardy as tomatoes, and may be treated similarly, taking earth up with them, when you can, after having first hardened them to the air before removal. Shield them from the hot sun with any large leaves or shingles, until they get rooted. Transplant into a fair soil, but not a rich one, as a moderate growth is stronger than a rapid one. Use a handful of rich compost about the young plants, to give them a start. If sown in Central New York, use a moderate hot-bed, or, what is much better, sow as late as May 10th, in a cold bed under glass. Further south, sow out of doors as you would cabbage. If you sow under glass, be sure to shade from the hot sun, in the middle of the day. Do this with straw sprinkled lightly over the glass, or with narrow boards. Begin before the seeds are up, and continue as long as they are in close beds. Out of doors, this is not usually needful. Few plants suffer so much from hot sun as young potatoes.

In transplanting, prepare the ground by deep ploughing. Lay off the furrows 3 feet apart. If possible, run a small sub-soil plough through the bottom of the furrow, to give depth to the culture. Place the plants 2 feet apart in the row, and but one plant in a place. Do not use poor plants if you have a tolerable supply, and set them a little deeper than they grew. Hoe and plough frequently until they are in flower, after which do nothing more than superficially scrape out the weeds. I advise not to hill potatoes in dry ground.

Dig early, though not quite so early as you do common field-crops, but before they are injured by wet, dark and damp weather. Remember that a seedling potato, the first year, sets and matures its tubers mostly after regular field-crops have got their growth. Seedlings dug somewhat early will not be so large, but they will be much more healthful than when dug later. Late-dug seedlings are often a little diseased, not from constitutional weakness, but by a law applicable to all tropicals when grown in unpropitious weather. In the fall, dig each hill alone. Having dug a plot, go over it once and again, most deliberately, throwing out every hill which seems weak, ill-shaped, or yellow-fleshed, or that spreads widely in the ground, or is small and immature. A seedling well cultivated, the first year, and yet making small tubers, will never afterwards ripen in season. Save each hill separately; that is, put such good hills, as can readily be separated, together, to the amount of three or four. Put these separate parcels in dry sand, in a barrel, placing strips of shingle between each parcel. In this way, store the whole. Throw away the small tubers, even of good hills, as they would be more trouble than profit. Some of the good sorts will be tolerably eatable when two seasons old; others will require from three to four years' growth, just as in the case of many fruits. Good seeds yield a very variable proportion of plants. In my experience, it has varied from one-fifth to four-fifths of the seed sown. Potatoes, cultivated in this manner, will mostly gain an eatable size the first year.

The number of potato seeds cultivated, in a troy ounce, is about 72,000, a thousand of which are as many as one person needs for an experiment. From these, one can obtain from 200 to 800 plants, half of which will appear sufficiently fine at the first digging in the fall to be saved for further trial.

RESULTS OF EXPERIMENTS IN THE CULTIVATION OF THE POTATO.

[Condensed from Results of the Cultivation of Potatoes on the Trial-field of the Royal State Nursery, near Potsdam, in Prussia, by Director General Lenné.]

In connection with the Royal State Nursery at Old Geltow, near Potsdam, is a trial-field, on which are cultivated and closely examined the plants assigned to that branch of government by the Board of Agriculture, or recommended by other persons for agricultural or industrial purposes. From the devastating effects of the late potato disease, a series of experiments were instituted by that establishment with the view of determining its nature, causes, and prevention, the principal results of which are as follows:—

In observing that one variety of potatoes better resisted the disease of the tuber than others, the Director General was led to make a number of experiments on different sorts, but only on those which had already been found to be of superior quality and healthfulness.

The position of the field employed for the purpose was quite open and exposed to the influence of the west and northwest winds. The soil was of a uniform character, consisting of a fertile, sandy loam, with a due admixture of clay, with a sub-soil sufficiently porous to allow the rains to percolate without under-drainage. The cultivation was principally performed with a hoe, the tubers planted in a rectangular form, at a distance of one and a half feet apart. The field was well manured with a composition of equal parts of horse and cow-dung. The weeding and earthing up of the potatoes were done in the usual manner.

THE TUBER.

The Occurrence of the Disease of the Tuber.—This malady had previously but slightly appeared on the trial-field, with the exception of the variety called "Early Hermaphrodite," in 1853, and the "Belgium Morning Dawn," in 1854, when it was estimated that one-fourth of the whole product was lost, the investigation of the greater or less susceptibility of each variety to the disease, being one of the principal objects in view. It could not be accomplished in less time than three years, a partial verification of which will be found in the table on a succeeding page.

Influence of the Color of the Skin of the Tuber in predisposing it to Disease.—Among other highly interesting and very remarkable results, may be mentioned the influence of the color of the skin of the tuber in predisposing it to disease. For a long period, without the guidance of comparative experiments, an opinion was prevalent that potatoes, which had a colored skin, resisted the disease better than those which were yellow or white. The result of the experiment in this respect was as follows:—

In 1852, out of 72 white or yellow-skinned varieties, 23 were diseased.
" 1853, " 110 " " " " 16 " "
" 1854, " 117 " " " " 5 " "

Thus, from an average of three years, about one-sixth of the white or yellow-skinned varieties was found to be affected.

In 1852, out of 15 red-skinned varieties, 1 was diseased.
" 1853, " 37 " " " 7 " "
" 1854, " 40 " " " 2 " "

—showing that, from an average of three years, about one-tenth of the red-skinned varieties became diseased. Again:

In 1852, out of 5 blue-skinned varieties, *none* were affected.
" 1853, " 14 " " " *none* " "
" 1854, " 16 " " " *none* " "

From the above, it must not be inferred, however, that the blue-skinned potatoes are exempt from disease under all circumstances, but

only in a less degree, and that those having white or yellow skins are the most susceptible to the malady.

Influence of the Form of the Tuber in predisposing it to Disease.—A comparison of the different varieties of potatoes, in reference to their distinctive form, furnishes results not less striking in regard to their predisposition to disease, than has been observed in respect to their colors.

The primary forms of the tubers were distinguished as rounded, elongated, and kidney-shaped.

In 1852, out of 71 rounded varieties, 21 became diseased.
" 1853, " 21 " " 10 " "
" 1854, " 130 " " 3 " "

Hence, from an average of three years, about one-eighth were found to be affected.

In 1852, out of 17 elongated varieties, 3 became diseased.
" 1853, " 27 " " 10 " "
" 1854, " 30 " " 2 " "

—showing that about one-fifth were attacked.

In 1852, out of 5 kidney-shaped varieties, none were diseased.
" 1853, " 13 " " " 2 " "
" 1854, " 13 " " " 2 " "

—indicating that about one-tenth showed signs of the malady.

Thus it will be seen, by this comparison, that tubers of an elongated form were the most susceptible to disease, and it is still more striking, and the more confirmatory of this opinion, that the two varieties above cited, the "Early Hermaphrodite," and the "Belgium Morning Dawn," were of this shape.

Influence of the Time of Maturity in the Predisposition to Disease.—The opinion entertained, that the early varieties were less subject to disease than those ripening late, would seem to be corroborated by the observations on those ripening before and after the middle of August.

In 1852, before August 15, out of 24 varieties, 4 were diseased.
" 1853, " " " " 41 " 3 " "
" 1854, " " " " 44 " 3 " "

Thus, from an average of three years, only about one-tenth of those of early maturity were attacked. Again:

In 1852, after August 15, out of 70 varieties, 20 were diseased.
" 1853, " " " " 122 " 20 " "
" 1854, " " " " 129 " 4 " "

—showing that an average of about one-sixth of late maturity became affected.

From the three comparisons, by color, conformation, and period of maturity of the tubers, it was decided that those belonging to the blue, rounded, early potatoes have the least predisposition to disease.

Varieties recently produced from Seed, not exempt from Disease.—Soon after the first appearance of the potato disease, it was be-

lieved by many that a new generation produced from the seed-ball, would be exempt, at least for a time, from attack. The experiments in this respect proved the reverse to be the case. Out of forty-one varieties, cultivated, in 1852, originated from seed four years before, sixteen were diseased, while, the same year, there were cultivated in all ninety-two old and new varieties, out of which twenty-four were attacked. The fact, however, that new varieties mature somewhat later than others may account for this predisposition to disease.

Influence of the Distance of the Plants apart upon the Health of the Tuber.—In making an experiment in two adjoining fields, homogeneous in the character of their soil, manured and treated alike in every respect, both were planted at the same time with a variety of red potatoes, with only this difference: one was planted almost twice as densely as the other. The hills in one field were 1½ by 2 feet apart, and those in the other a foot apart each way. At harvest, it appeared that those of the more open culture were quite healthy, while the others, for the most part, were diseased.

Influence of the Excess of Moisture on the Health of the Tuber.—In consequence of the unusual rising of the river Havel, in 1854, the lower grounds, near the trial-field, were overflowed to a point where the water remained in the draining furrows, so that the tubers which grew in the middle ridges, or dryer parts of the field, remained healthy, while those nearer the furrows were more or less diseased.

Influence of the Cultivation of Potatoes on the same Ground in consecutive Years, upon the Health of the Tuber.—In order to determine the influence of the cultivation of a variety of the potato for several years on the same field, a part of the trial-field was planted three consecutive years, annually renewing it with manure, from which it appeared that there were no injurious effects in extending the disease. Thus, in 1852, out of ninety-three varieties, twenty-four were diseased, and in 1853, out of one hundred and sixty-one varieties, twenty-two are recorded as unsound.

THE HAULM, OR VINES.

The Effects of the Blight on the Vines, and its alleged Reäction on the Tuber.—The attack of the disease on the vines of the potato had spread so extensively within the last two years on the trial-field, as well as the surrounding estates, that their vitality was entirely destroyed long before the maturity of the tubers, there being only a few varieties exempt from attack.

According to an opinion generally adopted, the blight of the vines and the rot of the tubers are the symptoms of one and the same disease. Furthermore, it is supposed that in most instances the disease of the vine is the precursor of that of the tuber. From the observations, however, in the experiments of the last two years, some doubts may be thrown upon this theory. By a glance at the annexed tables, it will be seen that, notwithstanding the vines of nearly all of the

varieties were blighted, nevertheless, most of them remained unaffected by the disease of the tuber. In 1853, a land owner in the vicinity harvested 60 wispels (1,930 bushels) of potatoes, and notwithstanding the vines were totally destroyed by the blight, the tubers were healthy. Furthermore, among the few varieties which did not suffer from the blight of the vines, in 1853, cultivated on the trial-field, two of them had diseased tubers.

In referring to the table, it will be seen that, within the last two years, there was a diminution of the yield when compared with the former year, in almost every variety, the tubers being smaller and less farinaceous. This phenomenon was attributed to the blight of the vines, as the prematurely dying off of the leaves could not but influence injuriously the complete development of the tuber.

The Degeneration of Varieties.—The opinion has often been advanced that varieties of the potato degenerate when cultivated many consecutive years upon the same field, and even when regular rotation of crops has been observed. If a decrease of yield each succeeding year is an evidence of degeneration, then this opinion has been corroborated by the experiments instituted. This deterioration can hardly be attributed to any other cause than repeated cultivation upon the same spot; for potato-fields next adjoining the trial-ground, which were treated in precisely the same manner, except that in them potatoes were planted for the first time, did not show any sign of this degeneracy, but had fine smooth tubers. Nor to the blight of the vines could the decay of the tubers be ascribed, for the tops of the potatoes in all the fields were blighted, but the tubers of the trial-field alone were injured. In 1854, the potatoes raised consecutively on the same ground, were planted in a new field, the product of which immediately assumed its former healthy appearance.

The Importance of a uniform Classification and Nomenclature of Varieties of the Potato.—In order to group and compare the different varieties with each other, whether nearly allied or otherwise, a classification was adopted indicating their distinctive marks and characteristics.

It was observed that the hue of the stalks of the vine was a criterion by which to judge of the color of the skin of the tuber. For instance, when the stalk was green, or sometimes mottled, near the ground, with violet-colored spots passing into green, the tubers were white. On the contrary, when the stalks of the varieties were of a violet color nearly to the top, the tubers were colored.

The blossom was also regarded as a constant mark for a variety, as no change had been observed in its color, form, or size, each sort adhering strictly to its own peculiarity. Some varieties matured only a limited number of blossoms, while in others, the petals dropped off before fully opening. The color of the blossom, however, had no relation nor connection, whatever, with the color of the tuber.

A distinction had already been made in varieties, the tubers of which were white, red, blue-skinned, bluish-black, or yellow, spotted

with blue; but it had never been observed that the color of any variety had changed from one tint to another, although it had occurred that in the pale-red varieties, by cultivation, the intensity of shade had diminished, leaving only dark spots in the cavities round the eyes. There was not, however, any variety, in the collection with which experiments were made, that was perfectly white, the skins being more or less yellow. In a similar manner, there were none precisely blue, as they appeared more or less of a violet shade.

In respect to the form of the tubers, three classes only were adopted, namely, the rounded, the elongated, and the kidney-shaped. The former included only those the length of which did not exceed double the thickness. The elongated varieties were such as exceeded in length double their breadth, and were cylindrical in shape. The kidney-shaped were those exceeding in length twice their breadth, with shallow-seated eyes, somewhat flattened, or with the root-end pointed.

The varieties were also characterised by the eyes of the tuber, which sometimes occurred in great numbers, often only isolated, while in others, they were found quite deep-seated, very shallow, or even elevated.

The mode of attachment of the tubers to the roots formed another basis for classification; sometimes they were attached closely to the lower part of the stalk, or some distance from it, to the main roots, while, in others, by slender roots of greater or less lengths.

Another basis of classification was the color of the flesh, or pulp. In cutting the tubers asunder, it was found that the flesh had the most diversified hues, varying from pure white to saffron yellow. Some varieties, with dark-colored skins, had red, violet-tinged, or marble flesh.

Conformably to the foregoing distinctions, the potatoes employed for experiment were divided into fifteen classes, each of which commenced with the varieties the most beautiful as to color and smoothness, and the most regular in their form.

The annexed table exhibits the names of the varieties, the time of harvesting, their size, yield, sanatory condition, and uses.

The yield of each variety is expressed in the table in *metzen*, to a Prussian square perch, which is equivalent to nearly 17 square yards, English. The metzen is equal to about 3 quarts, Winchester measure.

Under the head of "Sanatory Condition," the varieties are considered only in reference to those which manifested slight symptoms of disease; *h*, signifies healthy, and *d*, those which were diseased.

The names are transferred from the original Report, to enable one to order them for experiment if desirable. Small quantities of most of the varieties can be obtained on application to Director General Lenné, Old Geltow, near Potsdam, Prussia, by the mere paying for packing and transportation.

Results of Experiments on the Potato, at the Royal State Nursery, near Potsdam, Prussia.

No.	Names of Varieties.	Time of harvesting.	Size.	Yield per square perch in metzen.			Sanatory condition.			Vines.	Uses.
				1852.	1853.	1854.	1852.	1853.	1854.		
	I. *Yellow-skinned, Rounded, Yellow-fleshed varieties.*										
1	Frühste feinste volltragende Kartoffel	Aug. 15.	medium.			7		h	h	d	Good for the table.
2	Weisse englische Rostbeaf	Aug. 31.	small.	8	7	6½	h	h	h	d	" " "
3	Circassienne	Aug. 31.	medium.	5	5	5½	h	h	h	d	" " "
4	Runde frühe englische Treibkartoffel	Aug. 15.	medium.	6	8	6½	h	h	h	d	" " "
5	Everlasting	Aug. 31.	medium.			4½			h	d	" " "
6	Frühe Trauben-Kartoffel	Aug. 31.	medium.	6	5	4½	h	h	h	d	" " "
7	Frühe London-Kartoffel	Aug. 15.	medium.	5	6	6½	h	h	h	d	" " "
8	Frühe Mausekartoffel	Aug. 15.	medium.	8	7	7	h	h	h	d	Superior for the table.
9	Rocking	Aug. 15.	medium.			5½		h	h	d	Good for the table.
10	Braunschweiger Zuckerkartoffel	Aug. 31.	medium.	8	9	5½	d	h	h	d	Superior "
11	Holländische Zuckerkartoffel	Aug. 31.	medium.	5	8	5½	d	h	h	d	" " "
12	Ross early	Aug. 15.	medium.			7		h	h	d	Good " "
13	Frühe gelbe Heidelberger	Aug. 31.	medium.			8½		d	h	d	" " "
14	Frühe volltragende	Aug. 15.	medium.	12	5	6	d	d	h	d	" " "
15	Nr 1. v. Lengerke	Sept. 1.	small.			4			h	d	Undetermined.
16	Invermay early	Aug. 15.	large.	7	8	4	h	h	h	d	Good for the table.
17	Radland	Aug. 31.	medium.			4		h	h	d	Undetermined.
18	Späte niedrige	Sept. 15.	small.	10	7	4	h	h	h	d	Indifferent.
19	Frühe von Java	Aug. 15.	medium.	7	5	5	h	h	h	d	Good for the table.
20	Volltragende Samenkartoffel	Aug. 31.	medium.	8	6	9	h	h	h	d	" " "
21	Kleine runde späte	Sept. 15.	medium.	6	7	4½	h	h	h	d	Indifferent.
22	Runde gelbe Septemberkartoffel	Sept. 15.	medium.	5	6	4½	h	h	h	d	"
23	Gelbe späte zuträgliche	Sept. 15.	rather small.	9	6	8	h	h	h	d	"
24	Späte runde voltragende	Sept. 15.	rather small.	8	8	4½	h	h	h	d	"
25	Kleine rothblühende späte	Sept. 15.	small.	8	6	5	d	h	h	d	"
26	Runde gelbe hohe	Sept. 15.	large.	8	4	5½	h	h	h	d	"
27	Veränderliche	Sept. 15.	medium.	8	6	6	d	h	h	h	"

28	Traublättrige runde gelbe	Sept. 15.	medium.	6	5	6	h	h	h	d	Indifferent.
29	Blassroth gefl.ckte September-Kartoffel	Sept. 15.	large.	6	6	5	h	h	h	d	"
30	Kleine runde hohe	Sept. 1.	small.	5	5	4	h	h	h	d	"
31	Frühe Wachs-Kartoffel	Aug. 15.	large.		7	7		h	h	d	Superior for the table.
32	Frühe amerikanische Kartoffel	Aug. 1.	large.	6	4	6½	d	h	h	d	Good for the table.
33	Grosse weisse Americanische	Aug. 31.	medium.	5	6	7	d	h	h	d	" " "
34	Grosse Porto Allegro	Aug. 15.	medium.			4		h	h	d	" " "
35	St. Jean Kartoffel	Aug. 15.	large.	7	7	6	h	h	h	d	" " "
36	Englische Samenkartoffel	Aug. 31.	medium.			6½		h	h	d	Indifferent.
37	Pigmene	Aug. 15.	medium.			3½		h	h	d	Good for the table.
38	Späte englische	Aug. 31.	medium.			6½		h	h	h	" " "
39	Samenkartoffel von Caracas	Sept. 1.	medium.			9		h	h	h	" " "
40	Späte von Malta	Sept. 15.	large.	7	5	6	h	h	h	d	" " "
41	Grosse pommersche Zuckerkartoffel	Aug. 15.	large.	6	8	5½	h	h	h	d	Superior "
42	Familien-Kartoffel	Aug. 15.	medium.	8	10	6	h	h	h	d	" " "
43	Rouge et blanc	Aug. 31.	medium.			5		h	h	d	Undetermined.
44	Sächsische runde gelbe	Sept. 1.	medium.	10	5	6	d	h	h	h	Superior for the table.
45	Rothäugige grosse	Sept. 15.	large.	8	7	7	d	h	h	d	Indifferent.
46	Grosse runde Zuckerkartoffel	Aug. 15.	medium.			7			h	d	"
47	Early pallid american	Aug. 15.	medium.	6	8	6	h	h	h	d	"
48	Langburckersdorfer	Sept. 15.	medium.	9	5	5	h	d	h	d	Superior for the table.
49	Gelbe runde weissblühende	Sept. 1.	medium.	5	6	4½	h	h	h	d	" " "
50	Wintergrüne runde	Sept. 15.	medium.	10	4	5	h	h	h	h	Indifferent.
51	Runde krausblättrige	Sept. 15.	medium.	5	5	5	d	h	h	d	"
52	Unbeständige	Sept. 31.	small.	16	6	5½	d	h	h	h	"
53	Neunwochen-Kartoffel	Aug. 1.	very large.	10	7	5½	d	d	h	d	"
54	Schönblühende späte	Sept. 15.	medium.			4			h	d	Good for the table.
55	Weissblühende runde hohe	Sept. 1.	medium.	5	7	6	h	h	h	d	Indifferent.
56	Hohe späte gelbe	Sept. 15.	small.	10	6	4	h	h	h	d	"
57	Kleinblumige gelbfleischige	Sept. 1.	small.	5	6	4	d	h	h	d	"
58	Grosse gefleckte	Sept. 15.	large.	8	6	6	d	h	h	d	"
59	Hühnerei	Sept. 1.	medium.	10	8	6	d	h	h	d	"
60	Sicilianische Bunte	Sept. 1.	large.			8½		h	h	d	"
61	Shaw's early	Aug. 15.	large.			6½		h	h	d	"
62	Rauhhäutige Heidelberger	Aug. 15.	large.			4½		h	h	d	"
63	Kartoffel von Gent	Sept. 1.	medium.	6	7	7	h	d	h	d	"
64	Gelbfleischige glatte hohe	Sept. 15.	medium.	12	5	7½	d	h	h	d	Good for the table.
65	Hühnerei mit krausen Blättern	Sept. 1.	medium.	8	4	6	h	h	h	d	Indifferent.
66	Kartoffel mit halbgefüllter Blüthe	Sept. 1.	medium.	16	6	7½	h	h	h	d	"
67	Gelbfleischige Oktober-Kartoffel	Sept. 31.	small.	11	7	5	h	h	h	h	"

STATEMENT—Continued.

No.	Names of Varieties.	Time of harvesting.	Size.	Yield per square perch in metzen.			Sanatory condition.			Vines.	Uses.
				1852.	1853.	1854.	1852.	1853.	1354.		
68	Gelbe Müller-Kartoffel	Aug. 31.	very large			6½		d	h	d	Good for distilling.
69	Traubenkartoffel von Darfur	Aug. 31.	small.	8	4	2½	h	h	h	d	Indifferent.
70	Neue Intermedos	Aug. 31.	very large	10	6	6	h	d	h	d	Good for distilling.
71	Grosse Rohan	Sept. 1.	very large	8	9	12	h	h	h	d	" " "
	II. *Yellow-skinned, Rounded, White-fleshed varieties.*										
72	Gelbe von Cherveland	Aug. 31.	small.			3		h	h	d	Good for the table.
73	Feine runde späte	Sept. 1.	small.	8	10	5	h	h	h	d	" " "
74	Early prolific	Aug. 15.	medium.			5		h	h	d	Superior "
75	Beste deutsche gelbe	Aug. 15.	medium.			4		h	h	d	" " "
76	B. vom Herrn v. Lengerke	Sept. 1.	medium.			3½		h	h	d	Undetermined.
77	Nr. 96 vom Herrn v. Lengerke	Aug. 31.	medium.			3½		h	h	d	"
78	Lerchenkartoffel	Aug. 15.	medium.	3	5	4	d	h	h	d	Good for the table.
79	Frühe englische Treibkartoffel	Aug. 15.	medium.			5			h	d	" " "
80	Pointed Lady	Aug. 15.	medium			2½		h	d	d	" " "
81	Runde Mistbeetkartoffel von Macintosh	Aug. 15.	medium.			5		h	h	d	Indifferent.
82	Dewitser Samenkartoffel	Sept. 1.	medium.			7		h	d	d	Good for the table.
83	Weisse Raford	Aug. 31.	medium.			4½		h	h	d	Undetermined.
84	Joinville's Kartoffel	Aug. 31.	medium.			4½		h	h	d	"
85	Niedrige rothblühende glatte	Sept. 1.	medium.	6	7	5	h	h	h	d	Indifferent.
86	Kleine glatte volltragende	Sept. 1.	small.	8	7	5	h	h	h	d	"
87	Rauhhäutige grosse weissfleischige	Sept. 15.	large.	5	7	7½	h	h	h	d	"
88	Weissfleischige Oktober-Kartoffel	Sept. 31.	medium.	11	9	6½	d	h	h	h	"
89	Bastard Kartoffel von Solanum utile	Sept. 31.	small.			1½		h	h	h	Worthless.
90	Rothblühende weissfleischige	Sept. 1.	medium.	8	5	6	h	h	h	d	Indifferent.
91	Eiförmige weissfleischige	Sept. 15.	medium.	10	6	3½	h	d	h	d	"
92	Späte eiförmige	Sept. 1.	large.	7	8	6	d	h	h	d	"
93	Lammer's Sechswochen-Kartoffel	Sept 1.	very large.	8	10	6	h	h	h	d	Good for distilling.
94	A. von Herrn v. Lengerke	Sept 1.	small			sparse.		h	h	d	Worthless.

	III. *Yellow-skinned, Elongated, Yellow-fleshed varieties*											
95	Quedlinburger Samenkartoffel	Aug. 31.	medium.			6		d	h	d	Good for distilling.	
96	Tannenzapfen	Sept. 1.	medium.			4		d	h	d	"	"
97	Heidelberger Nudelkartoffel	Aug. 31.	medium.			4½		h	h	d	"	"
98	Frühe Zwitterkartoffel	Aug. 31.	medium.	11	5	5	h	d	h	d	"	"
99	Kartoffel von Sinzheim	Aug. 15.	large.			6		h	d	d	"	"
100	Bristol	Aug. 31.	large.			8		h	h	d	"	"
101	Lumpers	Aug. 31.	large.	9	7	7	h	d	h	d	"	"
102	Grosse weisse Rohan	Aug. 31.	very large.			6			h	d	"	"
103	Späte lange rothgefleckte	Sept. 31.	medium.	5	8	3	h	h	h	h	Indifferent.	
104	Zweiwüchsige	Sept. 15.	medium.	6	4	6	d	h	h	h	"	
105	Zwillingskartoffel	Sept. 1.	large.	4	6	6	d	d	h	d	"	
106	Niedrige lange gelbe	Sept. 15.	medium.	7	7	8½	d	h	h	d	Good for distilling.	
	IV. *Yellow-skinned, Elongated, White-fleshed varieties.*											
107	Liverpooler Kartoffel	Aug. 31.	medium.	9	6	6	h	d	h	d	Good for distilling.	
108	Lütticher Bisquit-Kartoffel	Sept. 1.	large.	4	6	6½	h	h	h	d	"	"
109	Grosse von Montevideo	Aug. 31.	large.			9			h	d	"	"
	V. *Yellow-skinned, Kidney-shaped, Yellow-fleshed varieties.*											
110	Frühe Mistbeet-Kartoffel	July 31.	medium.	4	6	3½	h	h	d	d	Good for the table.	
111	Frühlings-Cantaloup	Aug. 15.	large.	4	4	4	h	h	h	d	"	" "
112	De Boswik	Aug. 31.	medium.			sparse.	h	h	h	d	Indifferent.	
113	Sämling von Warczewitz	Sept. 31.	small.			sparse.		h	h	h	"	
	VI. *Yellow-skinned, Kidney-shaped, White-fleshed varieties.*											
114	Aaraktsche	Aug. 15.	very large.	6	8	10½		h	h	d	Good for distilling.	
115	Williamson's Nierenkartoffel	Aug. 31.	medium.			2½	h	d	h	d	Indifferent.	
116	Barbiere	Sept. 1.	small.			sparse.		h	h	d	"	
117	Nr. 50 vom Herrn v. Lengerke	Sept. 1.	small.			3½		d	h	d	"	
	VII. *Red-skinned, Rounded, Yellow-fleshed varieties.*											
118	Rothe Wetz de St. Jaffe-ten-Noode	Aug. 31.	very large.	8	4	6	h	h	h	d	Good for distilling.	
119	Rothe Futterkartoffel	Sept. 1.	large.			6			h	d	"	"
120	Frühe niedrige Rothe	Aug. 31.	medium.	10	9	8	h	h	h	d	"	"
121	Zweijährige	Aug. 31.	large.			6½		h	h	d	"	"
122	Rothe Neunwochen-Kartoffel	Aug. 15.	large.		8	3½		d	h	d	Indifferent.	
123	Erdbeeren-Kartoffel	Aug. 31.	large.	5	5	5½	h	h	h	d	Good for the table.	
124	Lawis Rothe	Sept. 1.	medium.			3½		h	h	d	"	" "
125	Rothe Eldenaer Samenkartoffel	Sept. 15.	very small.	2	3	1½	h	h	h	h	Worthless.	

STATEMENT—Concluued.

No.	Names of Varieties.	Time of harvesting.	Size.	Yield per square perch in metzen.			Sanatory condition.			Vines.	Uses.
				1853.	1854.	1855.	1852.	1853.	1854.		
126	Blaubunte	Sept. 1.	medium.			6		h	h	d	Good for distilling.
127	Lankashire pink	Aug. 31.	very large.			6		h	h	d	" "
128	Nr. 11 vom Herrn v. Lengerke	Sept. 15.	medium.			3½		h	h	h	Worthless.
	VIII. *Red-skinned, Rounded, White-fleshed varieties.*										
129	Imperial Kidney	Aug. 31.	medium.			4½		h	h	d	Good for the table.
130	Anglaise farinose	Aug. 15.	large.			5		h	h	d	" " "
131	Hettinger rothe	Sept. 1.	large.			5½		h	h	d	" " "
132	Rothe vom Gutsbesitzer Lastig	Sept. 1.	medium.	7	8	7½	d	d	h	d	Good for distilling.
133	Californische rothe	Aug. 15.	large.	5	5	4½	h	h	h	d	Good for the table.
134	Belgische Varry	Aug. 31.	medium.			3		h	h	d	" " "
135	Spargelkartoffel	Aug. 15.	small.			2		h	h	d	Undetermined.
136	Guhrauer	Aug. 31.	medium.						h	d	Promises fair.
137	Portshire red	Aug. 31.	medium.			5½		h	h	d	" "
	IX. *Red-skinned, Elongated, Yellow-fleshed varieties.*										
138	Todtenhagens Wohltragende	Aug. 31.	very large.			5½		h	h	d	Good for distilling.
139	Chatâigne	Sept. 1.	medium.			4½		h	h	d	Good or the table.
140	Kartoffel von Tournay	Aug. 15.	large.	5	6	6	h	h	h	d	Good for distilling.
141	Belgische Morgenroth	Aug. 31.	large.	10	7	10½	d	d	d	d	" "
142	Grosse Orange	Aug. 31.	very large.	13	7	8	h	d	h	h	"
	X. *Red-skinned, Elongated, White-fleshed varieties.*										
143	Beltjes lange Rothe	Aug. 31.	medium.			3½		h	h	d	Indifferent
144	Milord Airve	Aug. 31.	large.	3	5	5½	h	h	h	d	"
145	Hohe blassrothe	Sept. 15.	medium.	11	5	2½	h	d	h	h	"
146	Grosse James	Aug. 31.	medium.			2½		h	h	d	"

147	Englische lange Rothe	Aug. 31.	very large.			9			h	d	Good for distilling
148	Holländische Mangoldwurzel	Aug. 31.	very large.			5½		h	h	d	" "
149	Early pallid red	Aug. 31.	very large.	3	7	7	h	d	h	d	" "
150	Spanische Rothe	Sept. 1.	large.			5		h	h	d	" "
151	Grosse rothe amerikanische von der Westküste	Aug. 31.	large.	5	8	7	h	d	h	d	" "
152	Rothe Ananas-Kartoffel	Aug. 31.	very small.			sparse.		h	h	d	Indifferent.
	XI. *Red-skinned, Kidney-shaped, Yellow-fleshed varieties.*										
153	Favorite Liegeoise	Aug. 31.	large.			3		h	h	d	Good for the table.
154	Donna Maria	Aug. 15.	large.	3	5	4¾	h	h	h	d	" " "
155	Xaviere's Nierenkartoffel	Aug. 31.	small.			sparse.		h	h	d	Worthless.
156	Mausekartoffel	Aug. 31.	large.	12	5	4	h	h	h	d	Superior for the table
	XII. *Red-skinned, Kidney-shaped, White-fleshed varieties.*										
157	Lange rothe Hornkartoffel	Aug. 31.	medium.			3¾		h	d	d	Worthless.
	XIII. *Blue-skinned, Rounded, Yellow-fleshed varieties.*										
158	Blaumarmorirte	Aug. 1.	medium.	8	7	7	h	h	h	d	Superior for the table.
159	Golden Potatoe	Aug. 31.	medium.			5		h	h	d	Good " "
160	Raulhäutige Rothe	Aug. 15.	medium.			3		h	h	d	Worthless.
161	Grosse blaue amerikanische	Aug. 15.	large.	5	7	6	h	h	h	d	Good for distilling.
162	Blaubunte Guatimala	Aug. 31.	large.	5	5	5	h	h	h	d	Superior for the table.
	XIV. *Blue-skinned, Rounded, White-fleshed varieties.*										
163	Seyer's red	Sept. 1.	large,			5½		h	h	d	Good for distilling.
164	Grosse runde Spanische	Aug. 31.	medium.			5½		h	h	d	" "
165	Californische blaue	Aug. 31.	large.			6			h	d	" "
166	Blaue Orchard	Aug. 31.	large.			2		h	h	d	Worthless.
167	Isländische Rothe	Sept. 1.	medium.			5		h	h	d	Indifferent.
168	Norfolk	Aug. 15.	medium.			7			h	d	Superior for the table.
169	Frühe blaurothe Treibkartoffel	July 31.	medium.	6	8	5	h	h	h	d	" " "
190	Frühe blaue vom Handelsgärtner Richter	July 31.	medium.	5	8	6	h	h	h	d	" " "
171	Rock's Bunte	Aug. 15.	medium.			8		h	h	d	" " "
	XV. *Blackish-blue-skinned, Rounded, Violet varieties.*										
172	Falkoner's Kidney	Aug. 31.	large.			5½		h	h	d	Good for distilling.
173	Blauschalige Truffelkartoffel.	Aug. 31.	large.			6¼		h	h	d	" "

Statement of WILLIAM W. WOODBRIDGE, *of Paw Paw Grove, Lee county, Illinois.*

Potatoes of excellent quality are easily grown here. They were partially destroyed by the "rot" in the fall of 1855. "Pinkeyes" and "Mercers" are the favorite varieties. None but barnyard manure is used, and many of the farmers do not take the trouble to haul out even this.

The price for eating size is 50 cents a bushel. A year ago, they were worth $1.

Statement of JOHN BROWN, *of Long Island, Winnipisiogee Lake, near Lake Village, Belknap county, New Hampshire.*

Some years ago, I made an experiment with a view of settling a disputed point relative to the best portion of a potato to plant in reference to its size, and the productiveness of its yield. As the exact result had been mislaid, or lost, and as I have often since heard and read assertions directly contrary to the conclusions I arrived at, I resolved to repeat the experiment.

Accordingly, last spring, I planted four rows of equal length, side by side, with two varieties of potatoes. In one row, I planted only the "seed ends," so called, or those containing the most eyes, which included about a third of the bulk of the tubers, and in the next row, the "stem ends," the parts of the tubers which were connected with the roots. The two varieties were the "Pinkeyes" and the "Peach-blows."

The yield of the four rows was as follows:—

	Pounds
Pink-eyes, stem ends,	217
Pink-eyes, seed ends,	170¾
Peach blows, stem ends,	225
Peach blows, seed ends,	189

The potatoes raised from the stem ends were much larger than those from the others, and appeared to be from a week to ten days earlier. The result corresponded with that of my former experiment; and had the whole field been planted with the stem ends, the additional yield would have been more than 50 bushels to the acre.

I also planted two rows next to those named above, one with large potatoes, half a tuber to each hill, cut lengthwise, so as to divide the eyes of the tubers as nearly equal as possible, and in the other row, small uncut potatoes, one to each hill. From the former, I dug 181¾ pounds, and from the latter 134½ pounds. I would add that the average yield of the field was about 180 pounds to the row, and that large-sized potatoes were generally used for seed, cut lengthwise, with half a tuber to each hill.

Statement of D. R. STILLMAN, *of Alfred centre, Alleghany county, New York.*

Potatoes have not been extensively cultivated here, of late, in consequence of the "rot." The variety most raised is known in this region as the "Lake Erie," a red potato of not very good quality, but preferred, on account of its hardiness. Potatoes are planted here in April or May, in deep-tilled soil, with but little manure, as, in rich ground, they are considered more liable to injury from disease. The maximum yield is about 200 bushels to the acre; average, 100 bushels; and 40 bushels are as few as will pay expense of cultivation.

The usual price of potatoes here is 50 cents a bushel; cost of production, 25 cents. Transportation to New York, 25 cents a bushel.

Statement of GERSHOM WIBORN, *of Victor, Ontario county, New York.*

The common potato is raised here in large quantities, and to the best advantage on a dry, warm soil; but upon a wet, tenacious one, of late years, it has been considerably destroyed by the "rot," or "blight." This disease is now, however, diminishing in its appearance. Our old sorts, the "Meshannocks" (Mercers) and the "Blues" were so much affected by it, that they were often left in the ground undug. The "Early Pines" and several other new varieties, when planted on a dry soil and sparingly manured, do not suffer much by the blight.

The yield is about 100 bushels to the acre; but I could easily increase it, by high manuring, to 150 or 200 bushels, were it not for the fear of inducing the rot.

Statement of JOHN P. HALLER, *of Lima, Allen county, Ohio.*

Potatoes, in this county, had not been much affected by the "rot" before last season. They do best on new ground. The average yield per acre is about 150 bushels, worth 40 cents a bushel.

Statement of W. D. LINDSLEY, *of Sandusky city, Erie county, Ohio.*

In April last, I received through the Patent Office, a parcel of "Fluke" potatoes, from England, which I planted in six hills, in a rich sandy soil, well adapted to the growth of this esculent. They grew well, and ripened, by the 10th of July, retaining their original form, and were excellent in quality. Near these, I planted two rows of the "Meshannock" (Mercer) potato, but the yield of the Flukes was vastly greater, being entirely free from the "rot," while full one-fourth of the Meshannocks were destroyed by that disease, and did not ripen till three weeks later.

Statement of WILLIAM H. GOUDY, *of Buteville, Marion county, Oregon Territory.*

Potatoes, with us, are extensively cultivated to feed to hogs. They are cooked and mixed with wheat that has been "chopped." So far as I have tried them, I consider 2 bushels of potatoes equal to one of wheat for this purpose. A bushel of cooked potatoes, with a bushel of chopped wheat, is worth more than 2 bushels of wheat fed dry, after the manner some feed it in this county.

The mode of cultivating potatoes is to plough a well-manured piece of land in March, or as early in the season as the weather will admit, and let it remain until the 20th of April; then harrow it well, and plough again very deep, after which, lay it off in rows 3½ feet apart, dropping the potatoes in hills 2 or 2½ feet asunder, covering them with a hoe about as deep as corn. As soon as they are up, so that we can hoe them, we draw the dirt to them. When they are large enough, we plough and hoe again, drawing some earth to them, but do not hill up very high. We afterward plough and hoe again, to keep down the weeds. Some farmers take a pair of horses and plough, running one furrow on each side of the row, and another in the row under the potatoes, turning them out on the top. One man and two horses, with four hands to follow him, in this way, will dig about 300 bushels a day. The stock-hogs are then turned into the field to gather what are left. The average yield is 300 bushels to the acre on upland. Bottom land will yield from 400 to 700 bushels to the acre.

Statement of JAMES MCK. SNODGRASS, *of Mifflin, Alleghany county, Pennsylvania.*

Potatoes, in this section, are one of our most profitable crops. Several varieties are cultivated. The "Mercer," the "Pinkeye," the "Galena," and the "Long Reds," are the principal. Of the Reds, the average crop is 230 bushels to the acre. The other varieties yield about 160 bushels.

Statement of D. MINIS, *of Beaver Plain, Beaver county, Pennsylvania*

Since the occurrence of the potato disease, in this section, the yield has been quite uncertain. In some cases, from one-fourth to one-half has been lost, and in a few instances, the entire crop. The average yield is from 100 to 150 bushels to the acre.

The cost of raising an acre of potatoes is about $16; the price in the field, from 20 to 25 cents a bushel.

Statement of RICHARD LECHNOR, *of Stouchburg, Berks county, Pennsylvania.*

The potato has been extensively cultivated in this county, especially within the last few years. The most prolific and profitable varieties

are the "Pinkeyes" and the "Mercers." The latter find the most ready sale in market, although the Pinkeyes are the most prolific. The yield, the last season, was enormous, being from 200 to 300 bushels to the acre.

Our system of preparing the ground is as follows: A clover or Timothy sward is selected, the same as would be applicable to the culture of corn, and covered with a coat of manure at the rate of 8 loads to an acre. The tubers are planted in the furrows late in April; at the time of ploughing, covered with as much manure as possible, which is raked over them, and the sod or furrow-slice turned upon them, so as to cover them to a depth of 4 or 5 inches. A week after planting, the land is well harrowed, after which, the culture is about the same as that of Indian corn.

Statement of GEORGE M. WASSON, *of Cedar Springs, Clinton county, Pennsylvania.*

Potatoes, with us, would be a remunerative crop, at from 40 to 50 cents a bushel, were it not for the "rot," which makes its appearance annually. In the summer of 1853, I cultivated two fields, one upon land, considerably elevated, say 400 feet. The other, I manured and planted both lots in the same manner, about the 10th of May. The yield was good in both cases, being about 400 bushels to the acre. The tubers were very large and beautiful.

The varieties cultivated were the "Pinkeyes," "Large Round Blues," and the "Long Johns." Out of those grown upon the low ground, 5 per cent. were affected with the rot, while those upon the upland were all good.

Statement of NATHANIEL GREEN, *near Middletown, Newport county, Rhode Island.*

The potato, formerly, was one of our most valued crops, and was extensively cultivated; but, for some years past, it has been but little planted on the south part of the island, owing to its liability to "rot." On the north part, however, where the soil is warm and rather sandy, and where the water passes from the top of the ground soon after it falls, it is somewhat extensively cultivated. It is principally manured with menhaden fish, mixed with soil or sand, and applied in the hill.

The "Shenangos," though an early sort, are very liable to rot. The "Boston Whites" are considered the least liable to the disease, are early, good flavored, and yield well. The "Dover," a light-red potato, is much esteemed for the table, but is considerably affected by the rot, although it yields tolerably well. The best preventive of this disease is to plant as early in the season as the ground will admit, on warm dry land, manured with fish or horse dung put in the hill, which will bring the crop to maturity before the "blast," or rot, strikes. The disease, with us, for the last two years, has greatly diminished. The yield is from 100 to 200 bushels to the acre.

The price of early potatoes is from $1 to $1 50 a bushel. Ordinary varieties are worth 60 cents a bushel.

Statement of JAMES E. KENDALL, *of Poplar Grove, Kanawha county, Virginia.*

Potatoes are pretty generally cultivated in this county, and produce fine crops, especially when planted on new lands. Our soil is admirably adapted to raising sweet potatoes, which produce from 300 to 400 bushels to the acre, without extra culture.

SWEET POTATOES.

CULTIVATION AND MANAGEMENT.

BY HENRY J. DEAVER, OF MOUNT HOPE, MORGAN COUNTY, OHIO.

The sweet potato is here considered to be almost as indispensable as the common sort. My hot-bed, last year, was 60 feet long by 10 feet wide. I design the next spring to enlarge it three-fold. My mode is to place logs on a sloping piece of ground, say 10 or 12 feet apart. I then drive small stakes, or pegs, in rows 3 feet apart, and 8 inches high. The object is to have not more than 7 or 8 inches depth of manure, which should be fresh horse-dung, a mixture of hay, straw, corn-fodder, &c., trampled down level with the top of the pegs. I then put a coat of loam, 3 inches deep, upon the top of the manure, which answers for the dressing the subsequent year. I then place my tubers on, cover them from 2 to 3 inches deep, and then lay on boards, so as to keep them effectually covered from rain or cold until the plants are up. During the day, I let them have the sun, until I am sure they cannot be injured by frost. I sometimes water them, but not before the heat has somewhat subsided in the bed, which I ascertain by putting my forefinger through the covering. A very little warmth from beneatn is sufficient; there is more to be apprehended from too much heat than too little. Some place a covering of saw-dust on top of the bed; but this is entirely unnecessary. In this latitude, the beds should be made as early as the 10th or 20th of April. The plants will be ready for drawing, from the 8th to the 20th of May.

I select ground, for growing the tubers, that will produce good corn. To manure just before planting will cause the plants to run to vines. Good loam, with or without sand, such as we call "second year's land," lying to the sun, yields best. It need not necessarily be sandy, to produce the greatest yield; on the contrary, good loamy land produces tubers of the best flavor. I plough the ground well, when dry, and harrow thoroughly. It would even be better to cross-

plough it. Then, I throw two "moles" together, about 4 feet apart, and see that the ground is well pulverised, in order that the list may be clear from clods, sods, and trash, and that the land is in the best order to receive the plants. The time for transplanting is when the ground is what we call "dry." The mode of planting is to make a hole with the hand, or otherwise, of the proper depth to receive the young plant; and, when it is placed in the hole, I pour in half a gill of water, so that the earth may settle round the fibrous roots; then, I draw the dry earth around the plant, and compress it a little with a hoe. In less than twenty-four hours, the plant will be as vigorous as though it had never been removed. On good land, the distance of the plants apart should be from 18 to 20 inches; for thin land, 15 inches will be sufficient. The yield, in this section, is from 100 to 150 bushels to the acre. I should state that the plants require to be hoed about as much as corn. The vines should be thrown on the ridges, out of the way, while dressing. In digging, I use a large, long, flat, three-tined dung-fork, to throw the tubers out of the ground. When dug, I spread them to dry and wilt somewhat, preparatory to putting them up for winter, which requires much care. My place of keeping is a cellar-kitchen. I pack them in boxes of dry sand, placing a scantling upon the floor for the boxes to rest upon. I keep the sand from year to year, and sometimes have it kiln-dried.

The price of sweet potatoes here is from 62½ to 75 cents per bushel.

CONDENSED CORRESPONDENCE.

Statement of C. S. G. CLIFTON, *of Green county, Mississippi.*

Sweet potatoes are extensively raised in all parts of this county. Our gardens embrace the common variety, but there has not been so much attention paid to the subject as the demand for this article requires.

The tubers command from 30 to 40 cents a bushel.

YAMS.

THE CHINESE YAM.

This new esculent, it will be recollected, was first introduced into this country by the Patent Office, in the early part of 1855, and is described and treated of at length in the Agricultural Report for the year 1854. The form in which it was introduced was in small tubers about the size of peas, that had been propagated in France the year

previous, by covering the vines with earth, and severing them near the angles of each pair of leaves, after they had taken root. The result of its growth, in this country, the last season, was, that the vines and tubers were generally so small that most of those who experimented with it were disappointed in their expectations, and consequently abandoned it as a worthless product; but others, who better understood the nature of its growth, preserved the roots for a second planting, and will probably patiently await the result.

When cultivated in a deep, rich, loose soil, the small tubers, after the first year, will penetrate the earth perpendicularly to a depth of two or more feet, and will continue to increase in size from year to year, without becoming woody, like those of the parsnip and many other plants after the first season's growth. They may be planted in the spring, in the open air, as soon as the season is sufficiently advanced to be free from danger by frost, and may be cultivated somewhat after the manner of the sweet potato, or yam, of the South, except that they should remain undisturbed in the ground from one year to another, until they are ready for market or use. In the colder portions of the Middle and Northern sections of the Union, it would be well to protect them from frost during the winter, by covering the ground with a bed of spruce boughs, leaves, or straw, which should be removed as early in the spring as circumstances may require.

When fully matured and cooked, the Chinese yam is dry and farinaceous, much resembling in taste and appearance the common potato, and is more agreeable to the palate than the ordinary yam. Considering its property of persisting in the ground for several years without deterioration, being in readiness for the kitchen at all times, and all seasons, after the first year's growth, it cannot fail to prove an excellent substitute both for the sweet and the common potato in all localities where it will thrive. D. J. B.

CONDENSED CORRESPONDENCE.

Statement of W. D. BRACKENRIDGE, *of Govanstown, Baltimore county, Maryland.*

The two small tubers of the Chinese yam, (*Dioscorea batatas*,) which I received from the Patent Office, last spring, I started in a hot-bed, and planted them about the middle of May in a deep-yellow, loamy soil. In November, I dug up the roots, and found two of them over 2 feet in length and 4 inches in circumference.

This spring, I intend to plant these roots, and the small tubers propagated from the stems, and allow them to remain in the ground during next winter, as I think, in the second year, they will attain a large size by being protected from the frost.

Statement of D. BOLL, *of the city of New York.*

Some small pieces of the Chinese yam, which had been left over my spring sales, last year, I started in pots, and planted them out in the ground about the middle of June. During the summer, I used most of the vines for cuttings, to increase my stock, (of which every pair of leaves will produce a bulb,) and dug them in the beginning of October, to exhibit at the Fair of the American Institute, at the Crystal Palace. Such as had not been disturbed by cutting the vines, had grown to the length of 2 feet, and the lower end, which is always the largest, was about 3 inches in diameter, and weighed upwards of 2 pounds.

I left a few roots in the ground all winter, and dug them in April of the present spring (1856.) The severe winter did not affect them. They were in as fine condition as those dug in October, and were beginning to vegetate. If left in the ground 13 months, they will increase much more in proportion, and improve in quality. Those dug last fall kept well, none rotting nor sprouting before they were planted.

I had one cooked plainly, in water, with a little salt. The flavor was like that of a fine Kidney potato, and the yam was very white and delicious. I think it will prove a useful and profitable vegetable.

THE COMMON YAM.

CONDENSED CORRESPONDENCE.

Statement of JOHN B. C. GAZZO, *of La Fourche parish, Louisiana.*

The common yam (*Dioscorea alata*) grows very large here, the roots sometimes weighing over 35 pounds. It is propagated by planting pieces of the roots containing a portion of the rind, or skin, any part of which will germinate. It is commonly planted in March, and harvested in November.

This root is of a delicate flavor, and is highly nutritious. It is prepared for the table by roasting or boiling, being more highly esteemed than the common potato, to which, in taste, it has some resemblance.

TEXTILE AND FORAGE CROPS.

COTTON.

HISTORY AND RESULTS OF THE CULTURE OF COTTON IN BRITISH INDIA.

"Seeing that cotton is one of the indigenous products of India, and one which has been so long cultivated in the country for the uses of its inhabitants, it strikes one as extraordinary to hear India frequently adduced as a country incapable of producing the finer kinds of cotton." The thought, thus expressed by an intelligent English writer, has so long occupied the attention of the British public, that the efforts of the government and people to induce the cultivation of cotton of fine quality into India, have been continuous, though attended with partial success, from the year 1788 to the present time. At that period, the most elaborate investigations were made of the condition of the culture there, and instructions were imparted to the planters. Soon after, seeds of approved kinds were obtained from other countries and distributed; government plantations were established; machinery for cleaning and packing the fibre was introduced; and bounties were offered for the successful culture of exotic varieties. Subsequently, societies were organised in India, as well as in England, for the promotion of the object, and American overseers were employed to give practical instruction in regard to the culture.

These experiments were persisted in, until the year 1809, when the prospect of a rupture between the United States and Great Britain suggested such extraordinary efforts as induced an exportation to England from India of 30,000,000 pounds of cotton; but the intercourse with this country having been resumed, in 1810, sales were effected of only one-half of this large importation, in obedience to a law which has ever since prevailed, to the effect that the cotton of India is only purchased and manufactured to any considerable extent when the superior varieties from the United States and elsewhere cannot be obtained, the important exceptions being only a few first crops derived from newly introduced seeds. The theory upon which this is sometimes explained is, that such varieties degenerate in consequence of the unavoidable cross-fecundation with the native sorts; but it is more generally believed that this cause could not prove so uniform in its results, and that there must be some cases in which, in isolated situations, the exotic kinds would be protected from such influences. At all events, notwithstanding the efforts that have been made during the fifteen years ending with 1855, while the importation of cotton into Great Britain from the United States was about 8,800,000,000 pounds, that from India was less than 1,500,000,000 pounds, or in the ratio of about 6 to 1, as may be seen by reference to a statement made to Congress by the Secretary of State, dated May

30th, 1856. The value of these importations is not therein given; but in this particular the disparity would be found far greater.

In the attempts to improve the product of Indian cotton, not only has strict attention been paid to the peculiarities of the soil and climate of every latitude and altitude; but the best varieties of American seeds have been from time to time sent thither and cultivated in strict conformity with the modes pursued in the United States. In the earlier experiments, the Bourbon cotton was mainly relied upon. Failing in the more fertile regions of Bengal, the elevated, drier and lighter soil of Coromandel, which lie between the 10th and 20th degrees of north latitude, was tried. Here the plant grew to a great size, but yielded little cotton, and its cultivation was soon relinquished.

In 1829, the local government of Bengal placed at the disposal of a Society, to be given in premiums, the sum of $10,000; but this was unfortunately lost by the failure of an agency house. They at the same time authorised the establishment of an experimental farm, at an annual expense of $5,000, exclusive of rent, and appropriated $2,250 for buildings and stock for the first year. In the following June, there were received there a supply of cotton seeds of the "Upland Georgia," "Sea Island" and "Demarara" varieties, which, together with Captain Basil Hall's account of the culture of cotton in America, were presented to the Society by the Court of Directors of the East India Company. A farm at Akra, eight miles south from Calcutta, in latitude 22° 15′ N., comprising 166 acres, was taken, and active measures commenced in October, 1830; but, after the exertion of efforts deserving success, they did not arrive at favorable results, and the projectors of the enterprise were compelled to abandon it, in 1833.

It is proper here to remark that the committee in charge of this undertaking attributed their failure to many causes, but that the list did not include any presumed incompatibility of soil and climate. The enterprise was not resumed, however, and the real cause of failure was not demonstrated; still, it may interest the American cotton-grower to know what these alleged disadvantages were: The first was bad seed, and, if real, was radical enough; the second, error in the time of planting; the third, unsuitableness in the quality of the particular tract of land, which was in some places too rich, and in others too salt—unceasing "blooming" being the result; the fourth, a broadcast mode of planting and shallow digging; the fifth, a severe hail-storm, which, in 1832, destroyed everything but the lower parts of the stalks and roots of the plants—but as these bore promising crops, in 1833, the committee were in hopes that an improved mode of cultivating foreign varieties was thus suggested, and that a perennial plant had been obtained.

In the district of Dacca, in about latitude 24° N., which, before the rise of the cotton culture in the United States, had acquired a reputation both for its fibre and its muslins, high hopes were entertained of successful results. The opinion was expressed by the British commissioner of that district, that there was "nothing else to which the soil was so well suited as to cotton." In 1843, Mr. Price, a gentleman practically acquainted with the culture of cotton in America, was

appointed to conduct a series of experiments; and it is stated that he was indefatigable in his endeavors to visit frequently all parts of the district. He soon induced some of the indigo planters and others to introduce the American seed on their plantations, and the government authorised advances to be made to such "ryots," or permanent tenants of farms, as were willing to cultivate it, and engaged to purchase all the cotton they should grow; and an experimental farm was also placed under the personal supervision of Mr. Price himself. The result, however, proved a total failure; "yet," it is added, "as the American plant, in some instances, grew and bore flowers, not for a short time only, but for months together, we cannot help thinking that there was something incompatible in the soils selected, or in the methods of culture adopted." Several causes of failure are given in this instance, also, and a most commendable purpose of persistence is still expressed.

The destruction by insects, as described, would of itself be sufficient to account for at least the unprofitableness of the effort. It is remarked that "the indigenous cotton, being hardier and more hairy, is less attacked by insects." Mr. Price experimented with the Bourbon cotton, also, which, like the other varieties, was of too rank a growth, from 3 to 4 feet in height being attained by it, as well as by the others, in a very short time. He at length arrived at the conclusion that the improvement of the cotton-culture of that region could be best effected by giving due attention to the native varieties.

In Rungpoor, latitude 26° 55′ N., the natives had made experiments with Mexican seed, prior to 1844, and thought it better than their own varieties; but it was greatly injured by the depredations of insects. The same year, Mr. Terry, another American, commenced a series of experiments there, but bad health compelled him to desist.

The above experiments, and the over-luxuriance of the fields of Southern India should have admonished the cultivators of cotton to seek more favorable localities; and this thought was suggested to the minds of many who had known that, when the cotton manufactures of Bengal were in high repute, much of the raw material was conveyed thence from the regions of the north-west; yet, notwithstanding this, we find that the marked and decided effort made by the British government, in 1840, was directed towards Bengal, as well as to higher regions. It was then that Captain Bayles, who had been sent to the United States for the purpose, returned to India, accompanied by ten Americans, well skilled in cotton-growing, with seeds, ploughs, gins, presses, and other tools. Three of these persons were sent to Madras, three to Bombay, and four, with Captain Bayles, to the Bengal Presidency. The latter four were located near each other on the Jumna. Subsequently, however, one of them attempted a model farm at Agra, a second went to Goruckpoor, and a third to Rungpoor, while Mr. Price was at Dacca. Experiments were thus in progress on eight farms on different parts of a line about 800 miles in length. Captain Bayles remained at Humeerpoor, a central situation.

In the first reports of these eight planters, dated in November, 1840, they complained of some disadvantages, but expressed the

opinion that cotton could be "produced in abundance," and that "there is no question that the soil is excellently suited for cotton." The first season, however, was dry and unproductive, and the only satisfactory part of the experiment was the establishment of the fact that the indigenous varieties of India could be improved by the adoption of the American mode of cultivation. It is said that those of them, which were experimented upon, continued green and bearing bolls when the fields cultivated by the natives were dried up and barren.

In Bundlecund and the Doab, in about latitude 25° N., the experiments which were made led to the conclusion that irrigation alone, was needed to insure success; but there are few situations in which irrigation by artificial means has enabled the tillers of the soil to compete with those whom heaven has favored with abundant showers. In the subsequent efforts of these American culturists, with Mexican seed, and the indigenous cotton, they were subjected to disappointments as grievous as the first, and it was concluded that "neither land, nor money, nor the zeal of men, nor the labor of cattle, will suffice, unless the elements are favorable." One of them stated in his report that "Bundlecund is and always will be too dry ever to produce cotton to advantage;" and that "the seasons in this part of India are too short, even if they were more favorable." Another reports: "The grand characteristic of this country appears to be a flood, a drought; the latter greatly predominating." They still thought, however, that Rohilkund or Goruckpoor might answer; and they accordingly made tours through the Doab, through Goruckpoor and its adjoining districts, through the country in the Sangor and Nerbudda territories, and toward Agra in the north-west. In the latter region, one of them established a model farm, in 1843, and facilities were afforded to the neighboring "ryots" to enable them to cultivate cotton upon their respective farms. But the whole experiment proved a failure. The crops were ruined both by drought and floods. In 1846, a decided effort was made in this same locality to improve the native cotton and adapt it to the English market by improved modes of cleaning; but the shortness of its staple rendered it unacceptable to the Manchester spinners, and the enterprise failed.

In 1843 and 1844, ample experiments were made at Goruckpoor, by Mr. Blount, one of the Americans, heretofore alluded to, who, in the first year, attributed his failure to various causes, such as the lateness of the season, the depredations of cattle, precocious maturing, the ravages of the caterpillar, &c. In the second year, success was despaired of at the end of September; but, strangely enough, there was a subsequent improvement, and a small crop of fair cotton was produced. The experiment nevertheless was abandoned as futile, although there were many who thought this partial success should have induced further efforts.

It has been herein stated that the attention of the British government was directed to this subject, in 1788, but the first actual experiments by the English were made at Madras, in 1790, when Dr. Anderson was engaged in distributing Mauritius and "Brown Malta" seeds in different parts of the Peninsula. It is stated that Dr. Rox-

burgh had even then ascertained that the dry and less fertile soil of Coromandel was better suited than that of Bengal to the Bourbon cotton. In 1813, Mr. Metcalfe arrived with American cleaning machines at Tinnivelly, the district in which, by careful culture, a Mr. Hughes had succeeded in producing good Bourbon cotton. In 1819, the Madras government determined on establishing a cotton farm of 400 acres, under the care of the Commercial Resident in each of the four districts of Tinnivelly, Coimbatore, Masulipatam, and Vizagapatam. Mr. Heath, who held the above office in Salem and Coimbatore, succeeded by observing the directions of Mr. Hughes. Under his culture, cotton came to perfection 150 miles from the sea; and, in the season of 1823–4, he obtained in Coimbatore 500 bales of clean Bourbon cotton, making an average of 233 pounds to the acre. The result of this experiment demonstrated that, at least in peculiarly favorable circumstances, cotton of a fair quality may be produced in this locality; but, that profit may be derived from its culture, even under these circumstances, has not been made to appear by any recorded facts.

In conclusion, it may be inferred, as on a former occasion, that it is not the British government, the supply of funds, nor the employment of imported agents and improved machinery, that will ever profitably produce cotton in India. Aside from the obstacles in her climate, she is not a conquered country. Asiatic princes have given way before British soldiers, but the governed, at heart, remain what they were. Directors and capitalists may patronise, men of science may suggest, and culturists may execute, but all in vain. D. J. B.

ACCIDENTS AND DISEASES OF THE COTTON PLANT.

BY TOWNEND GLOVER.

Cotton, like many other plants, is subject to diseases, caused principally by accidents, the defects of the soil in which it grows, the depredations of insects, and the effects of the weather. Those which are the most fatal may be described as follows:—

SORE-SHIN.

One of the diseases to which the cotton-plant is subject, commonly known among planters as the "sore-shin," is sometimes occasioned by a careless stroke of the hoe, scraping the outer bark from the stem while the plant is yet young and tender. The sap being arrested by the wound, that part of the main stem above the injury dwindles away, becoming both weak and brittle. Although the regenerative powers of the plant may afterwards produce new bark *from the sides* of the wound, and the injury heal up, leaving only a

larger or smaller cicatrix, or scar, according to the extent of the wound received, the stem eventually becoming so attenuated and weak, as frequently to break off at or above the place where the wound was first made.

The preventive of this disease would be, to take great care when hoeing, not to bruise nor injure the young plant, as, when the growth is once stopped by an accidental bruise, or abrasion of the bark, the plant, if not broken down by storms, or the weight of its own top foliage, will always appear stunted or weak.

There is also said to be another species of "sore-shin," to which the young cotton-plant is liable, differing entirely from that occasioned by careless hoeing, the cause of which is attributed by many to cold, cutting winds, when the plant is very young. Others, however, assert that, when a high wind shakes the tender plant, the main stem is so much bent and twisted, that the sap-vessels are upturned, and a serious injury occurs; but the wound is sometimes healed, and if the cotton grows vigorously afterwards, it apparently outgrows the shock.

FRENCHING.

In certain portions of the plantations, in many parts of Florida, individual plants grow with white or variegated leaves. This peculiarity is termed "Frenching;" but, as I observed only a few thus marked, it may, perhaps, be only a sport of nature, similar to the variegated leaves of cultivated plants of our gardens. Indian corn, however, is subject to "French;" and, in this case, the disease has been attributed to some imperfection of the soil; to improper use of manures, as well as to various other causes. Be this as it may, it appears as if only certain spots, varying in area in the same field, are attacked, sometimes in succession, year after year, while the remainder of the crop is perfectly healthy and good. When corn is thus *Frenched* on what are termed "Frenched lands," it grows light-colored, sometimes almost white, or striped, and bears no crop. Until this Frenched land has been thoroughly and properly analysed, it would be useless to say anything more on a subject so little understood; and I merely mention this disease here to invite public attention to it, and to induce practical farmers to experiment, in order to find out the cause, and, should one be discovered, to suggest some remedy for its removal.

THE EFFECTS OF A BAD SUB-SOIL.

When on the plantation of Major Haywood, of Tallahassee, in Florida, in the month of August, several very fine, and apparently healthy cotton-plants, from 4 to 5 feet in height, covered with forms and bolls, were observed to be dying suddenly, in certain spots, the leaves being withered, as if the damage had been done within twenty-four hours. Such plants eventually died; and, on taking them up, no worm, insect, nor injury, either external or internal, could be discovered; and the only conclusion that could be drawn was, that some of the roots had suddenly penetrated into a soil totally unfitted for, and evidently deleterious to, the life of the plant. What ren-

dered it the more singular was, the fact that other cotton-plants were growing most luxuriantly within one or two feet of that which was stricken.

THE RUST.

The cotton-plant is also subject to a disease called the "rust." The leaves, when first attacked, appear rather yellower than the rest, with red spots on the surface, and often, margined with the same red color. These leaves then turn yellower and redder every day, until the plant assumes a bright-red or almost a carmine appearance, when, finally, the whole of the foliage turns more of a brown color and falls to the earth. When the disease attacks the boll, it assumes a different appearance, and is termed the "red" or "black" rust, as the case may be. The cotton, in such bolls as have been attacked by the black rust, and the bolls themselves, shrivel up, and turn dark-colored, as if they had been severely blighted or mildewed, and are totally valueless.

This disease has been attributed to leaving pokeberry plants in the field. But this, I have never observed, and suppose the assumption to be on the same principle that the mildew on wheat was formerly attributed to the influence of the berberry bush. Others state that rust is owing to an undue proportion of lime in the earth, and that it is no doubt caused by some organic or inorganic imperfection of the soil in which it is grown; but, until such soil shall have been thoroughly analysed, and its component parts correctly ascertained, nothing certain can be known about it. There is also another theory in regard to the subject of the rust: that it is entirely owing to atmospheric changes, and not to the soil. Experiments, however, ought to be instituted to find out the real cause, and the result made known, as the disease has done, and is at present doing, much injury to the crops of the South. Salt, sown at the rate of half a bushel to the acre among cotton, is stated to be a certain preventive of the rust, and to restore the plant to its former vigor; but several planters whom I have spoken to on the subject, deny the fact, and say that salt had no effect whatever.

There is also another species of rust caused by an *acarus*, which will be found described on a preceding page.

SHEDDING OF YOUNG BUDS, OR BOLLS, CAUSED BY WET WEATHER.

When the cotton-blooms, or flowers, are exposed to the heavy and beating rains of a Southern climate, especially between the hours of ten and two, as they are opening, or have already opened, it frequently happens that such blooms prove barren. The outer calyx turns yellow, and eventually the unfertilised flower and immature boll fall to the ground, the seeds turn brown, and the fibre of the cotton is worthless. This is generally attributed to the heavy drops of rain washing away the pollen which should have impregnated the pistil; the embryo seed-vessel, of course, never matures, but dries up and perishes. Bees, wasps, and insects in general, are Nature's agents in distributing the pollen, or fertilising dust. As they fly from flower to flower, small particles of this dust adhere to some part

of their bodies or limbs, with which they impregnate the next flower while in search of honey or more dust.

Sometimes the pistil and stamens of a cotton-bloom are found eaten in such a manner as to distort them. This injury is often caused by the very young boll-worm, which, penetrating the young flower-bud by a hole through the outer calyx, where the egg was laid, after eating several of the enclosed stamens and anthers, and injuring one side of the pistil, bores into the embryo boll, before it is shed. I have reared several caterpillars found in such situations, and proved them to be the true boll-worm. Moreover, I have found the hatched shell of the egg on the outer calyx, and traced the caterpillar's track through the petals to the stamens, and finally to the boll itself. I will not, however, enlarge on this subject here, but refer to the article on "The Boll-worm," in a former part of this Report.

THE ROT.

The "rot" has been attributed to a variety of causes, such as changes in the atmosphere, defects in the soil, the attacks of insects, and to the growth of fungi. Mr. Troup, in the "American Farmer," describes its appearance with great accuracy. He says: "The first indication is seen in a small circular spot on the outside of the boll, exhibiting a darker green than the circumjacent parts; as if a globule of water had been dropped upon it, and been absorbed. Many of these are frequently seen at the same time on the same boll. They spread themselves, sometimes faster, sometimes slower, as if induced, either by the state of the atmosphere, or condition of the plant, changing color as they progress, until they assume a dark-brown, approaching to black, and until the whole exterior is in like manner affected; or until it receives, from some cause, a sudden check, and then this appearance is only partial. In the first case, the disease has penetrated to the centre of the fruit, the fermentation is complete and universal, and is seen in a frothy, white liquid thrown out on the surface. Putrefaction follows, and the destruction of the seed and immature wool being finished, nothing is left but the rind, or exterior coating of the boll, which, exhausted of its juices, hardens, turns black, and thus terminates the process. In the other case, (that of suddenly checked disease,) the interior of the boll in some instances remains unhurt; in others, it is only partially injured; and, in the last case, the pods, remaining unhurt, mature and expand. This, however, rarely happens, as the disease is wonderfully capricious, going and coming unaccountably, attacking at one time with more, at another with less violence; so that the fruit, which escapes entire destruction on the first attack, may fall a victim on the second. Nor is this capriciousness justly attributable to the changes in the atmosphere, as its origin does not seem to have any connection with the weather."

It is very difficult to find out the true cause of this disease, as it sometimes appears in dry as well as in wet years, although it is generally more destructive during rainy seasons. The young bolls are often found rotted, as well as the half-matured and old, so that the

age of the fruit does not appear to have anything to do with it. Many of them may have the interior entirely dried up and destroyed, while others will open with only one or two segments rotted, the rest being perfectly healthy, and filled with good white cotton.

As to the theory of a defect in the soil, it has been stated by some planters that barnyard manure will often produce it; but, if this is the case, it is somewhat singular that it has often been observed that one plant may be very badly affected by the rot, while others on each side are perfectly healthy and uninjured, as has often been observed. This fact appears to show that a great deal depends upon the constitution of the plant itself, which may be inherited from its parent, and perhaps a choice of good sound seed, from strong and healthy plants only, might in time have a great effect in remedying this disease; and, as we know that much depends upon the vigor, health, and prolific qualities of the parent plant, it might perhaps be well to make experiments by planting seed of diseased, and sound, healthy plants, in the same situation and soil.

The fungoid growth, found on the old rotted bolls, when they begin to open, may perhaps be regarded more as the result than the cause of the disease. Several insects, it is true, have been found in these rotten bolls, where most probably they had crept for food and shelter, after the boll had become rotten, while others have been caught in the very act of piercing the bolls; but this subject will be found treated at greater length under the head of "The Boll," and insects found in or upon it, on a preceding page.

While on the subject of the rot, it may be well to mention that, there are three glands on the inside of the outer calyx, at the bottom of the boll, and three on the outside between the "ruffle" and stalk, which secrete and give out a sweet substance, which ants, bees, wasps, and plant-bugs avail themselves of as food. I have seen young bolls, apparently healthy, suddenly drop from the plant, and, on being carefully cut open, showed a wound which had been pierced by the trunk of some insect, in one of these glands, and that a watery rot had commenced where the boll had been stung. It was evident that this rot had been caused by the piercer of some insect unknown, as the puncture could be traced throughout its length to the heart of the lower part of the injured boll.

CHEMICAL RESEARCHES ON THE SEED OF THE COTTON-PLANT.

BY CHARLES T. JACKSON, M. D., OF BOSTON, MASSACHUSETTS.

In the course of my geological excursions through the States of North Carolina, South Carolina, and Georgia, I had an opportunity

of becoming somewhat acquainted with the natural history of the cotton-plant, and was much interested in the cultivation of that important crop, as well as in the economical uses of the seeds, which are thrown out in such enormous quantities from the "gin-houses," where the pure fibre is separated from the bolls. These refuse cotton-seeds are partly saved for planting, but by far the greater mass of them is allowed to rot, and is then used for manure, in preparing the soil for the cultivation of Indian corn, as well as for a new cotton-crop. It appears, however, from my recent inquiries, that cotton-seed may be profitably employed in the production of a rich, fat oil, and that the woolly fibre, adhering to the hulls, may be economised in the manufacture of paper, while the substance of the seeds, or their "meats," after having the oil extracted, may be employed for feeding animals; and, probably, would also serve as an excellent fertiliser, which would operate as a more permanent and efficacious manure than the more highly stimulating guano, now so extensively used at the South.

The object of the present paper is to call the attention of Southern planters and of Northern manufacturers to these new uses to which cotton-seed may be applied, trusting that even this very humble and incomplete essay may attract the attention of more able hands.

Any one who has walked over the rich plantations of the Southern States, at the period of the inflorescence of the cotton-plants, must have been struck with the great beauty of the extensive fields, all covered with rich verdure and beautiful, delicate, blue, pink and white flowers, appearing like those of the mallows, magnified to the size of small hollyhocks, or althæs, the flowers not only terminating the delicate stems, but also putting forth, in many axils of the lateral leaf-stalks; while, at a more advanced period, the ripened cotton-bolls are seen bursting with their snowy flocks on the lower part of the stem, and yet the capping flowers still continue to bloom, and to prepare a continuous supply of fibre, until the frost finally checks their career, and closes in the harvest, constituting one of the most curious and interesting of agricultural scenes. The ebony-colored laborers are for several months employed in picking the cotton-bolls as fast as they ripen, and thus the labor is rendered lighter by being so much divided. Troops of them, with their baskets of snowy cotton upon their heads, are seen tramping homewards in single file, and keeping time to their merry song.

Botanists are uncertain as to the number of distinct species of this plant. De Candolle describes thirteen species, in his "Prodromus," and mentions six others, but considers them all uncertain. Swartz thinks they may all be referred to one original species, of which many varieties have been produced by cultivation, and by the effects of different climates. "The plants inhabit different parts of tropical Asia, Africa, and America, and many of them are cultivated for their cotton in climates adapted to their growth." It is believed to be indigenous to Asia, as well as to America, but is cultivated in most warm countries, of both continents. It requires a certain duration of warm weather, as well as an amount of moisture, to perfect its seeds, and, in the United States, cannot be profitably cultivated north of Virginia.

A short time since, I was called upon by Mr. Daniel W. Messer, who has taken out a patent for a method of separating the hulls from cotton-seeds, to make a chemical analysis of those deprived of their hulls by his process and machinery. I was pleased to undertake this investigation, and have extended my researches much beyond what was required of me, for the purpose of being able to contribute something towards the agriculture of the Southern States.

I am aware of the fact, that cotton-seed oil is now made in New Orleans, but am informed that the yield of the unprepared and woolly seeds is very small, in comparison with that I have been able to obtain from those which have been hulled.

I know also that Professor Shephard has given an analysis of the ashes of unprepared cotton-seed, but I have not been able to find a copy of his report, so as to compare his results with mine.

The analyses hereafter given were made on hulled seeds, dried at 212° F.

My first analysis was made for the purpose of determining the proportion of fixed oil contained in the seed; the next was a chemical examination of the properties and composition of the "oil-cake," or what remains of the seed after the extraction of the oil; the third gives the true elementary constitution of the oil-cake; and the fourth, the nature and proportions of the inorganic principles, or mineral salts, contained in the ashes of the incinerated oil-cake, and, also, that of the seed before the oil was separated. It will be understood by chemists, that a vast deal of labor has been required to work out all these results.

Separation of the Oil.—In order to separate the fixed oil, pure ether was employed, and it was found that 100 grains of the dried pulverised seeds yielded, in one experiment, 39.7, and in another 40 per cent. of pure fatty oil. By pressure, I was able, with a small screw-press, to obtain only 33 per cent. of oil, but I have no doubt a more powerful one would have given a larger yield. The specific gravity of the oil, which I obtained from the etherial solution, was 0.923, water being unity. This, is also, the specific gravity of purified whale-oil.

Cotton-seed oil is stated, by Dr. Wood, to be a drying oil; but that which I have obtained does not appear to possess drying properties, serving perfectly well for the lubrication of machinery, and for burning in lamps, as well as for making soap. It will also serve as a substitute for olive-oil, in many cases, and perhaps may be eaten as a salad-oil, for it has no disagreeable odor nor taste.

Chemical Examination of the Oil-cake.—Linseed oil-cake is well known, both in Europe and in this country, as valuable food for cattle, and as an excellent fertiliser, worth from $40 to $45 per ton, for the latter purpose. On examining my cotton-seed oil-cake, I found it possessed a sweet and agreeable flavor, and was much more pure and clean than linseed oil-cake. One hundred grains of the seed leave 60 grains of oil-cake. This cake, examined for sugar, was found to contain 1.1 grains, and for gum, 35 grains were obtained. Iodine gave

no proof of the existence of any starch in cotton-seed, nor in the oil-cake. Alcohol dissolves out the sugar, which is like that obtained from raisins, and is grape-sugar. Boiling water dissolves the gum, and becomes very mucilaginous. The gum is precipitable from the water, by means of pure alcohol.

Ultimate Analysis.—Cotton-seed being quite peculiar in its nature and character, I was disposed to investigate the elementary constitution of the oil-cake, and having, with great care, made the organic analysis, and verified it by repetition of the process, I obtained the following results in per-centage:—

Carbon,	37.740
Oxygen,	39.663
Nitrogen,	7.753
Hydrogen,	5.869
Salts (inorganic),	8.960
	99.985

These salts were obtained by the combustion of a separate portion of the same cake.

Wishing to determine the nature and chemical composition of the salts contained in the seed, I burned 300 grains of them to ashes, in a platinum crucible, and obtained 16.5 grains of ashes, which yielded alkaline salts, soluble in a small quantity of water, and other matters, which I dissolved in acids. Of the 16.5 grains of ashes, I found 9.13 grains consisted of phosphate of lime.

On separation of the various salts, and reducing them to their ratios, for 100 grains of the oil-cake, I found the results to be as follows:—

Alkaline salts, soluble in water,	0.13
Phosphate of lime,	3.04
Potash,	0.46
Soda,	0.53
Phosphoric acid, with traces of sulphuric acid and chlorine,	0.81
Silica and oxides of iron and manganese,	0.18
	5.15
Loss,	0.35
	5.50

The whole amount of phosphoric acid present was 2.456, and of lime, 1.34 per cent. The excess of phosphoric acid, beyond that required for the saturation of the lime, was combined with the alkalies, soda, and potash. The chlorine and sulphuric acid existed in unweighable traces, in so small a quantity of ashes.

The foregoing analyses of cotton-seed justify and explain the use made of them by the Southern planters, in preparing the soil with the rotted seeds, as a special manure for Indian corn, which draws so

largely on the soil for phosphates. It will also be seen that, since the cotton-seed oil-cake contains nearly 8 per cent. of nitrogen, and nearly 6 per cent. of hydrogen, the elements of ammonia are present in sufficient quantities to form about 10 per cent. of ammonia, a powerful stimulant to vegetation, and a solvent and carrier of humus into their circulation. The carbon is more than sufficient to take up all the oxygen in the formation of carbonic acid, another active fertiliser; and the excess of carbonaceous matter will remain and form humus, or vegetable mould, which the alkalies, soda, potash, and ammonia will, in part, dissolve and carry into the circulation of plants, which possess the power of approximating and converting it into their tissues. The phosphates go ultimately to the seeds, and, in Indian corn, and in wheat, concentrate wholly about the germs, in their mucilage, or "chits." Thus it is proved that every ingredient of cotton-seed cake acts as a nutriment to vegetation.

CONDENSED CORRESPONDENCE.

Statement of J. J. PRATT, *of Centre, Cherokee county, Alabama.*

Cotton, it is thought, does not succeed so well here as in localities southward. Our proximity to the mountains sometimes causes partial failures in the crops. Notwithstanding, when the seasons are good, the product will compare with that of the regions bordering on the Atlantic and the Gulf. Thus far, the plant has not suffered with us from the depredations of insects, nor from the effects of "rot" nor "rust," as in the counties farther south. It is sometimes injured, however, by rust in particular soils; but this evil is only partial, being principally confined to the alluvial sandy lands near the banks of the rivers or creeks.

The average product of cotton to the acre, I believe, is nearly equal to that in the southern part of the State, and far exceeds it in proportion to the number of hands employed. It is thought that the cost of cultivating it, preparing it for market, and transporting it to Rome, in Georgia, is 8 cents a pound. The freight, by water, to that place, is from 15 to 20 cents per 100 pounds. The average yield to the acre may be estimated at from 600 to 800 pounds in the seed, or from 250 to 400 pounds clean.

At Rome, the present price is from 7 to 8 cents a pound.

FLAX AND HEMP.

CULTURE IN RUSSIA.

Next to the culture of Cereals and the rearing of domestic animals, the culture of flax and hemp, both as textile plants and as oleaginous

grains, is the most important branch of Russian husbandry. The gross value of these products amounts, at a very moderate estimate, to about 55,500,000 of silver roubles ($43,500,000); and both soil and climate are exceedingly favorable to their culture, throughout a great part of the empire. As their production greatly exceeds the wants of the home manufacture, the extension of their culture essentially depends on the facility with which they find an outlet in the foreign market. Flax and hemp have always formed two of the principal exports; and, if to these we add oleaginous grains, which consist principally of the seeds of hemp and flax, we shall find that the export of these three articles, taken as a whole, exceeds in value that of any other product. In the course of twenty-nine years, from 1822 to 1850, inclusive, there were but four, namely, 1830, 1831, 1846, and 1847, in which the value of exported Cereals was greater than that of these.

From the custom-house returns, we find that, during the period in question, the total value of exports for European commerce amounted to $1,427,586,225, about 12¼ per cent. of which was in flax, 10¼ per cent. in hemp, and 8¾ per cent. in oleaginous seeds. These figures forcibly show the importance of the culture of these textiles to the foreign commerce of Russia, as well as for her domestic manufactures. In this branch of agriculture, she has not hitherto met with serious competition, as the other countries of continental Europe, in which these articles are produced, not having much land to spare for that purpose, and finding it, from their greater relative population, more profitable to cultivate other crops, do not raise enough for any considerable exportation; for, nowhere in Europe can they be cultivated in such abundance as in Russia. Of other countries, it is the East Indies and the Philippine Islands that furnish England the largest supplies, say, from 10,000 to 12,500 tons per annum, and the United States, which export at present not over 5,000 tons. England, moreover, imports from Egypt and other parts of Africa, about 200 tons of flax and hemp, an amount comparatively insignificant.

It is well known that the immense increase in the use of cotton fabrics was of the utmost prejudice to the linen manufacture in every country of Europe; while the cotton manufacture assumed gigantic proportions, the fabrication of linens was arrested in its progress, and in many countries fell into a state of decay. England, alone, formed an exception, a circumstance which she owed to the invention of flax-spinning machinery. With its characteristic enterprise and foresight, British industry, seconded by abundance of capital, speedily appropriated and improved the French invention, and, applying it upon a large scale, it succeeded in turning the depressed condition of the linen manufacture in other countries to its own advantage. English linens, which, forty years ago, were an article of secondary importance in the markets of the European continent, and in most trans-Atlantic countries, have since acquired an importance menacing this branch of industry of Germany, as well as of every other country. During the triennial period, 1827 to 1829, inclusive, the average annual export of linen manufactures from Great Britain amounted to 57,706,125 yards, representing a value of $10,218,725; and, during the period,

1847 to 1849, inclusive, the mean annual export amounted to 96,530,308 yards, representing a value of $14,277,010, which exhibits an increase of 67 per cent. in quantity, and 40 per cent. in value. In 1850, the exportation amounted to the enormous quantity of 122,397,457 yards, or double the mean exportation of the triennial, 1827–29; and this immense exportation from England followed the largest exportation of flax from Russia that ever took place, namely, that of 1849, which amounted to 192,068,597 pounds (tow included); of which 70 per cent. were sent to England, without reckoning the exportation thither, by way of Elsineur and the Prussian ports; so that the exportation to Great Britain may be taken at upwards of three-fourths of the whole. This important branch of Russian commerce, it may be stated, has generally followed step by step, the progress of the linen manufacture, in England, and has more than tripled, in extent, since 1822. The average of the three years, 1822 to 1824, inclusive, was only 56,848,803 pounds, while that of 1848–50, inclusive, amounted to 173,519,400 pounds, being an increase of 205 per cent.

From the foregoing, it is evident that the linen manufacture of England and the flax-culture of Russia are mutually dependent upon each other. The former could not maintain, and still less increase, its present prosperity, without being sure of receiving from Russia an abundant supply of the raw material at a very moderate price; and the Russians, on the other hand, would be at a loss for the disposal of their surplus produce, if they were not assured of an outlet in the British market.

Notwithstanding the heavy blows continuously dealt out to it, by the increasing use of cotton goods, the linen manufacture still maintains the foremost rank in Russia, in point of extent and importance. It is not, like the cotton manufacture in Great Britain, the United States, and other countries, concentrated in large establishments, which strike the eye by their size, their machinery, and the numbers of workmen collected on the premises; but, conducted within the modest walls of the peasants' cottages, it is diffused over the whole length and breadth of the land. There is scarcely a village within the wide limits of the empire, where the wheel, the distaff, and the loom are not to be found.

With regard to the extent of this species of industry, it is averred that linen forms one of those articles of prime necessity which no individual in Russia, rich nor poor, can entirely dispense with. Reckoning only 10 yards, 28 inches in width, for each inhabitant, per annum, it would require for the population of 65,500,000 (including Poland) a consumption of 655,000,000 yards.

The culture of flax for commerce is most extensively carried on in the governments of Wologda, Wiatka, Jaroslaw, Wladamir, Nowgorod, Pskow, Livonia, Courland, Smolensk, Wilna, and Witebsk, and that of hemp in the governments of Tschernigow, Koursk, Orel, Toula, and Tambow. This important branch of rural economy has attracted the special attention of the Russian government, and I will mention a few of the steps that have recently been taken by the Ministry of Domains with a view of promoting its progress:—

1. After having appointed special commissioners to examine and

report upon the present state of flax-culture and the linen manufacture, at home and abroad, the Ministry published the results of its researches.

2. The commissioners also published 6,000 copies of a treatise on the preparation of flax.

3. The Flemish method of cultivating and preparing flax was introduced on the farms of Gorigoretsk and Wologda, which serve as practical schools.

4. Models of improved heckling machines have been sent into various districts.

5. Premiums have been awarded for the best qualities of flax exhibited at the shows.

6. In order to give facilities for the home trade, flax fairs have been established in Livonia.

7. Constant efforts are made to facilitate for the western provinces the means of procuring good seeds from the government of Pskow.

8. Persuaded that the introduction of mill-spinning would afford the most effective stimulus to the improvement of the culture of flax, the government has held out encouragements to the first undertakers of that branch of industry; and, accordingly, at least three establishments of this description have been founded within the last three or four years—two in the government of Wologda, and one in that of Moscow.

In regard to the culture of hemp, a commission was also appointed to examine into the subject, and its Report points out the defects of the system and the remedies which might be applied.

Connected with the culture of flax and hemp, oleaginous grains also form an important part of Russian products for European commerce, as has been stated on a preceding page. In those foreign countries where rape and other oil-producing plants are extensively raised, the great object in the cultivation of lint and hemp, as textiles, is to obtain the longest stalks and the finest filaments. For this purpose, the seed is sown very thick, so that the plant, finding no room for lateral development, attains considerable height, and produces finer fibres, though, on the other hand, it yields much less seed. But, in Russia, where these plants are cultivated for the sake of the seed, as well as of the lint, the opposite mode of sowing is pursued. It is obvious that this branch of industry might be rendered at once more extensive and more lucrative by improving, first, the culture, and then the preparation and assortment of the products. For it is well known that the various qualities of flax—its color, elasticity, length, flexibility, and the strength and uniformity of its filaments, greatly depend on seed, soil, and culture, as well as on carefully securing and "retting" the crop, and in preparing the flax for sale. But, in all these respects, Russian practice is careless, and the operations are generally performed in a slovenly manner and with very imperfect instruments. Yet it does not seem to be the necessary result either of soil and climate or of the general condition of rural economy, but may be attributed to a combination of circumstances which time, enterprise, and intelligence may remove. D. J. B.

CONDENSED CORRESPONDENCE.

Statement of DANIEL PATERSON, *of Fayette, Howard county, Missouri.*

The average yield of hemp, in this section, is about 1,000 pounds to the acre.

Price, at St. Louis, $125 per ton.

Statement of L. E. DUPUY, *of Shelbyville, Shelby county, Kentucky.*

Hemp is a valuable crop with us. When we select a good piece of land, of light, rich soil, and plough early in the spring, pulverising thoroughly with the harrow, and sow in May, the crop is ready to harvest in August. The cost per acre is as follows:—

Interest on land,	$4
Ploughing and harrowing,	2
Seed and sowing,	2
Cutting, two hands one day,	2
Stacking and re-spreading to dew-rot,	2
Breaking 800 pounds at $1 per 100 pounds,	8
Cost per acre,	20
Value of 800 pounds of hemp at $5,	40
Profit per acre,	20

This may be considered a fair average, though the product is often more or less, and the price also is fluctuating. It is usually sold in this county, and made into rope for baling cotton, and then sold at Louisville and New Orleans, to the cotton planters.

Hemp, in its cutting and breaking, requires the stoutest hands on the farm. One good able-bodied man can take care of 5 acres. The breaking is usually done in February, March, and April, as the weather may suit. Each man has 100 pounds per day for his task, and is paid for what he breaks above that amount, at the rate of $1 per 100 pounds. The men break from 100 to 200 pounds a day.

SISAL HEMP.

BY WILLIAM C. DENNIS, OF KEY WEST, FLORIDA.

Dr. Henry Perine, who was for a time Consul at Yucatan, among many other exotic plants, introduced into the southern part of this State, the Sisal hemp (*Agave sisalana.*) He also introduced two

other species of the agave, which, from their hardy, self-propagating natures, not only survived the effects of the change of climate, but increased rapidly until they were destroyed by the Indians, in 1846. One of them was the "Pulque plant," from which is manufactured, in Mexico, the celebrated domestic drink of that country; and the other was the "Great American aloes," or "Century plant," (*Agave americana,*) the fibre of which is manufactured into cordage and various other articles of use. Of these three kinds of agave, so far as I know, the Sisal hemp is the only one which appears to be of much importance to us in an economical point of view, although further acquaintance and experiments may prove the other two likewise valuable, especially the latter.

The gigantic plant out of which Sisal hemp is made, delights in arid, rocky land, which contains a super-abundance of lime. This is precisely the condition of the soil of these Keys, and the extreme southerly part of the peninsula of Florida, where, alone, it could be cultivated in the abscence of frost. It requires less culture than other products, but is much benefitted by keeping down the weeds; and although it grows best on lands which have the deepest soil, yet it grows well where there is but little soil that appears among the rocks, sending its long, penetrating roots into the clefts and crevices of the rocks in search of black, rich vegetable mould. In fact, the lands on these Keys, and much of it on the southern point of the peninsula, are nearly worthless for every other agricultural purpose, so far as is known; yet there are thousands of acres in this region where a ton of cleaned Sisal hemp can be made to, the acre yearly after the plant has arrived at such an advanced stage as will allow the lower leaves to be cut from it, which takes, in this climate, from three to five years to grow, according to the goodness of the soil, and the attention given to keep the land clean of weeds, grass, &c. It is no longer an experiment here, as to the growth of the plant, nor of the amount of the product; nor is there any longer a doubt as regards the value of the fibre, a number of tons of it having already been collected and sent to market, where it readily brought within a half cent to a cent per pound as much as the best kind of Manilla hemp; that is, in the neighborhood of $250 per ton. About a thousand plants should be set on an acre, and, from many young ones coming up from the long lateral roots, if these be kept at proper distances, it will be seen that the same land will require no re-planting, if coarse vegetable manure be applied from time to time. After the plant is of sufficient growth, the lower leaves are cut off, at proper times, leaving enough on the top to keep it healthy. These leaves are composed of a soft, watery pulp, and are from 2 to 6 feet long, and in the middle, from 4 to 6 inches wide, being frequently 3 inches thick at the but, having the general shape of the head of a lance. They contain a gum, which is the chief cause of their being rather troublesome in separating the fibres from the pulp. Neither the epidermis nor this pulp is more than a powder, after becoming dry, if the gum be entirely crushed and washed out. This is a most important fact in relation to the manner to be adopted to cleanse the fibres from the pulp. As these are continuous and par-

allel, and embedded in it, I feel certain that a system of passing the leaves through a series of heavy iron rollers, firmly set, something after those used in grinding sugar-cane, and throwing water upon the crushed leaves, in jets, or otherwise, in sufficient quantities to wash out the gum, (which is perfectly soluble in it,) will thoroughly clean the fibres without any loss; so that, after they are dry, and have been beaten to get out the dust, they will be fit for market. At any rate, the right plan for separating the fibres has not yet been discovered, although there has been enough done at it to show that they can be got out at a profit. Here, the people either preserve the primitive plan, which is practised in Yucatan, of beating and scraping the leaves, or simply crush them in a pair of rollers, afterwards steeping the crushed ones in an alkaline solution for a few days, and then clean the fibres by a kind of combing process. But either scraping or combing destroys too many of the fibres, by breaking them, which would not be done by a system of rolling and washing out the gum. In Yucatan, they ferment the beaten leaves in water, or mud; but this stains and weakens the fibres, so as to reduce their value, I believe, more than half. Even steeping the crushed leaves in an alkaline pickle, although it may not weaken the fibres much, as the juice of the leaves is acid, destroys that silky gloss which they possess when got out of the fresh leaves, with the aid of pure water alone; besides, it needlessly increases the expense, if it can be dispensed with.

A good deal of attention is being paid to setting out the plant on this Island, and on some others along the Reef. I have some 50 acres, and continue to increase the quantity as I have opportunity. About 3 acres have a good crop of leaves now, and 15 acres have been planted nearly three years; so that it will be necessary for me soon to turn a part of my attention to cleaning this pulp. I have made up my mind to try the rolling system, and wash out the gum with water. This last article, in a pure state, will be the most difficult to get, in carrying out the plan on these Keys.

THE CHINA GRASS—ITS HISTORY AND USES.

BY GEORGE C. SCHAEFFER, M. D., U. S. PATENT OFFICE.

By the praiseworthy exertions of Mr. W. R. Smith, of the Public Conservatory, in Washington, there is now afforded an opportunity of ascertaining how far the China grass (*Bœhmeria nivea*) can be successfully cultivated in the United States. There seems to be no difficulty in multiplying the plants, and none in obtaining them in the condition in which they yield the fibre of commerce. This being the case, it is proper that some notice of the history of the plant, and its product, should be furnished for the information of those who may feel disposed to attempt its cultivation.

China grass-cloth has been known as an article of commerce for many years, but the plant furnishing the material was only identified about the commencement of this century, by Dr. Roxburgh, whose labors in bringing to notice the fibres of the East, are only now beginning to show their effect upon commerce. Another indefatigable laborer in the same field, Dr. J. Forbes Royle, has recently published a work containing a complete summary of the history of this and other Oriental fibres.

The *Bœhmeria nivea*, (formerly known as Urtica nivea,) belongs to the nettle family, every subdivision of which abounds in fibrous plants. Dr. Roxburgh described it under the name of *Urtica tenacissima*, from specimens obtained in Sumatra, and, subsequently, he learned that this was the plant yielding the famous "China grass." More recently, the identity of the Chinese and Indian plants has been determined beyond dispute. From its wide diffusion throughout the East, this plant is known under various names, such as "Cha," or "Tchou Ma" in China; "Caloee," in Sumatra; "Ramee," in Malay; and "Rheea," in Assam. Gradually increasing in commercial importance, this product only obtained the notice of the public, generally, at the London Exhibition of 1851, where it was presented in every condition, from the crude article to the woven fabric, showing a fibre of such beauty and strength that three prize medals were awarded to different persons for specimens in the prepared state. Samples of these, now in the collection of the United States Patent Office, I have submitted to examination, the results of which will be given below.

Of the value of this fibre I can give no better evidence than the statement of Dr. Royle, that, as imported into England, it has "sold for £60 to £80, and even for £120 a ton." In some parts of India, the plant is only cultivated in small quantities, by the fishermen, for the manufacture of their nets, lines, &c. The use of the fibre, for cordage, is not likely to make its cultivation an object in this country; but the great strength, which especially fits it for this purpose, may be noted. Various samples, tried against the best Russian hemp, show that it bears a weight, sometimes nearly double, and always much more than that borne by the hemp. In China and elsewhere, it is mainly employed for making the grass-cloth, the softness and strength of which give it a character distinct from that of the fabric of any other fibre.

Generally, three crops are taken a year at intervals of about two months. The most rapid growth, in the second cutting, yields the finest fibre.

The treatment of the crop varies very much, but, in general, it closely resembles that of hemp, except that the fibres are peeled from the stalks by hand. They are next exposed to the dew, at night, and to the sun, by day, avoiding rain. In other cases, they are soaked in lime-water, or even boiled in a slightly alkaline solution. Sometimes, again, the fibre is spun, or even woven before it is bleached.

In short, the treatment is similar to that of other fibres which have to be stripped from a woody stem, the only variations in the process depending upon the relative hardness of the wood, which may

be brittle or tough, and therefore easily or with more difficulty separated from the fibre. It is not improbable that the process of "breaking," used for hemp or flax, will also be applicable to this product.

The most successful treatment of the material, after it has reached Europe, consists in steeping it in water at a temperature of 90° F., for twenty-four hours, and then boiling it in an alkaline solution, after which, it is well washed, in clear water, and nearly dried by high-pressure steam.

It may be noticed that the fibre of the plant, which has grown wild, has also been sent to Europe; but this, as might be expected, is much coarser than the cultivated product.

The specimens of the crude material examined were those above named, obtained from the London Exhibition of 1851, and others kindly presented by Joseph Balestier, late Commissioner to Cochin-China, &c., which were also accompanied by the plant itself, obtained by him in Java.

The chief difference in the specimens is in the color, which, in the Java plant, is lighter, with a tendency towards green, and with somewhat more of a gloss.

The half-bleached and full-bleached line and tow, as received from London, were compared with the best specimens of English, French, and Belgian flax, from the same exhibition, which last, as usual, were unbleached. A very slight examination at once shows the remarkable difference between the two materials. The filaments of the flax line, although very fine, showed the ends of the component cells, which, on repeated handling, separated from each other. The filaments of the China grass, on the other hand, although they had been subjected to the process of bleaching, showed no such loose ends; and, after long continued manipulation, still remained smooth, glossy, and, apparently, single celled. To be certain upon this point, specimens, after boiling in an alkaline solution, of a strength which would insure the separation of the individual cells, were repeatedly passed back and forth, between the fingers, and then carefully examined, from end to end, under the microscope. Every effort was made at all doubtful points, by needles, to obtain a separation, if possible. As evidence of the care bestowed upon the examination, it may be stated that from one to two hours were more than once expended upon the scrutiny of a single fibre. The result of this close inspection was the development of the fact that the single cells of the line of the China grass are of an extraordinary length, often equal to, and sometimes far exceeding, that of the longest of which we have any record. Five, 6, and 7 inches seem to be not unusual lengths. In one case, a filament of over 10 inches in length was severely handled, without showing any signs of being composed of more than one cell; but, in this case, the microscope was not used. Even the tow of the bleached fibre furnished, in abundance, single cells, or fragments, 3 inches or more in length.

We are now prepared to understand the great strength of the "China-grass" cordage, as, in any given length, it has fewer breaks of uninterrupted continuity than any other fibre. The character of

the single cells is as follows: In diameter, they exceed those of fine flax, of which, however, many are required to make a line of equal length. In cross section, they are irregular, and the greatest diameter is found, sometimes in one direction, and sometimes in another, somewhat after the manner of cotton. This gives them an advantage in spinning, furnishing a better hold of the fibres upon each other than if circular in section.

It is said that specimens of the Oriental fabric have been examined, in which the thread was untwisted, being made up of long filaments, joined end to end by some glue or cement. We know that this is true of the celebrated "pigna," or "piña," a fabric made from the pine-apple fibre, and the facts above named show that it may also be true of the China grass. This untwisted thread gives a peculiar transparency to the fabric, which cannot be imitated. No attempts have ever been made in Europe, nor in this country, to reproduce such an article, which, probably, requires too much manual labor to be profitable. The full-bleached line above mentioned is remarkably glossy and soft, and in some respects is not unlike silk in appearance. The whole character of the fibre is so distinct as to prevent any mistake as to the recognition of the article.

Although we have no mention of the employment of the tow, there can be no doubt of its applicability to the manufacture of an excellent fabric. The fibre, obtained by different cultivators, can be transmitted to the Patent Office for examination. In order to have a long, fine fibre, the crop should stand pretty close, and, when in small patches, it should be surrounded by other plants of similar height, in order to have the whole yield of the same quality. Or, the exterior plants may be used for propagation, leaving only the tallest to be tried for their fibre.

CONDENSED CORRESPONDENCE.

Statement of W. R. SMITH, *of the Public Conservatory, Washington, District of Columbia.*

From a small paper of the seeds of the "Chinese Grass-linen plant," (*Bœhmeria nivea,*) which I obtained from the island of Jamaica, I propagated, under glass, about fifty plants, and subsequently removed them into the open air. From these, I hope to be able to continue to propagate others, by cuttings, during the next and succeeding summers, in sufficient numbers to meet futnre demands.

The seeds, which are small and require close attention, I sowed in March, in an eight-inch flower-pot, filled with equal parts of leaf-mould, common soil, and sand, covering them lightly with a sifted portion of the same soil. In order to keep them moist, I spread over the surface of the pot a regular layer of sphagnum, or bog-moss,

which I removed as the plants came up. By these means, the seeds readily vegetated in a temperature of 55° F.

This product can also be multiplied, in the spring, by cuttings of the half-ripened shoots, planted in sand, regularly moistened, and shaded from the bright rays of the sun. Beneath the sand, which should be about 2 inches deep, there should be placed a layer of sphagnum, say an inch in thickness, to admit the roots freely, and afterwards facilitate the transplanting.

My impression is, that this plant will survive the winter in the open air, in any part of the United States, except the mountainous districts, south of Pennsylvania; and it may possibly become naturalised in the extreme South. It will thrive in any ordinary soil.

GRASS, HAY, AND OTHER FODDER.

THE PROPER TIME FOR CUTTING TIMOTHY.

BY JARED P. KIRTLAND, M. D., OF CLEVELAND, OHIO.

The proper time for cutting Timothy meadows, (herds-grass of New England,) with reference to securing the best qualities of hay, has been a fruitful subject of observation and remark. Little or no attention has been paid to the influence of the time and manner of cutting, over the health, permanency, and productiveness of such meadows. A vague idea prevails, among farmers, that, if the mowing be performed before the seed of this species of grass is ripe, it will run out, from a failure to re-seed the ground. Every observing farmer has noticed that, in some instances, extensive tracts of Timothy sward have suddenly died, soon after the removal of the crop of hay, while, in others, the sward continued healthy, and for a series of years produced abundantly of this grass. The rationale of such opposite results, under apparently similar circumstances, had never been explained, so far as my information extends.

My neighbor, Richard McCrary, an intelligent and practical farmer, has recently presented me with the annexed propositions and conclusions, as the result of his experience on this subject. These he illustrated by specimens of the grass, in every condition to which he alludes. It is hoped they will be thoroughly scanned, by persons competent to test their accuracy. If they bear this test, to Mr. McCrary the credit of the discovery of the facts solely belongs; and I have no doubt the community will consider him as having conferred an important benefit.

1. Timothy grass (*Phleum pratense*) is a perennial plant, which renews itself by an annual formation of "bulbs," or, perhaps, more correctly speaking, tubers, in which all the vitality of the plant is concentrated during the winter. (See Figure 1.) These form, in whatever locality the plant is selected, without reference to dryness or mois-

ture.* From these, proceed the stalks which support the leaves and head, and from the same source spread out the numerous fibres, forming the true roots.

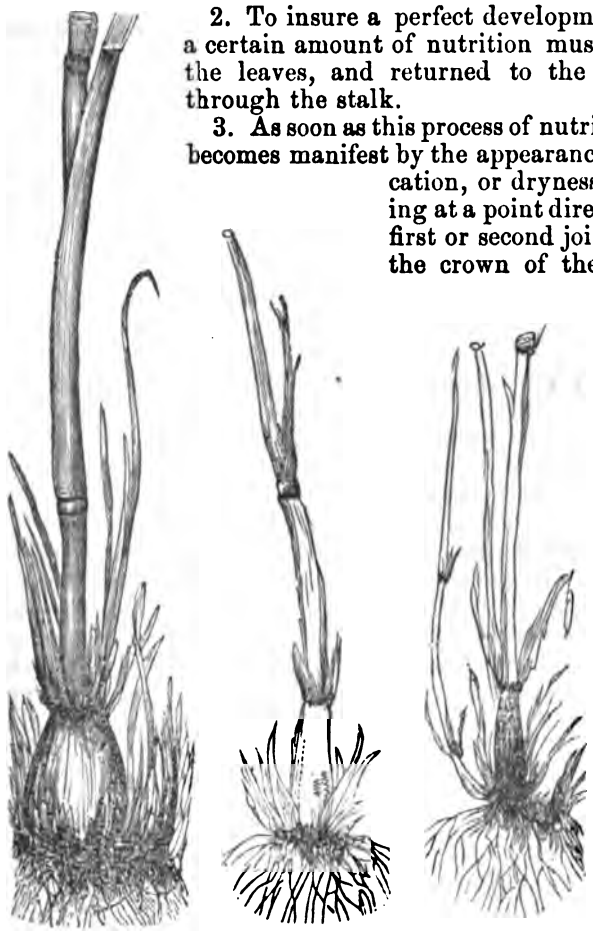

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Fig. 1. denotes a mature and fully developed tuber, from which the stalk was cut, some distance above the point at which desication commences, and at a period after the process had begun. (Proposition 3.)
Fig. 2. shows a partially developed tuber, exhibiting lateral growths of small tubers and shoots, the effect of premature cutting. (Proposition 4.)
Fig. 3. exhibits a dead tuber, caused by cutting below the point of desiccation. (Proposition 5.)

2. To insure a perfect development of these tubers, a certain amount of nutrition must be assimilated in the leaves, and returned to the base of the plant, through the stalk.

3. As soon as this process of nutrition is completed, it becomes manifest by the appearance of a state of desiccation, or dryness, always commencing at a point directly above either the first or second joint of the stem, near the crown of the tuber. From this point, the desiccation gradually progresses upwards, and the last portion of the stalk that yields up its freshness is that adjoining the head. Coincident with the beginning of this process is the full development of the seeds, and with its progress they mature. Its earliest appearance is evidence that both the tubers and seeds have received their requisite supplies of nutrition, and that neither the stalk nor the leaves are longer necessary to aid them in completing their maturity. A similar process occurs in the onion, just above the crown of the bulb, indicating the maturity of that organ.

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* Mr. Lapham, in his valuable article on "The Grasses of Wisconsin," (Transactions of the Wisconsin Agricultural Society, Vol. 3, 1853, page 425,) says: "When growing in very dry places, bulbs are frequently formed on the roots of Timothy grass, as a sort of store-house of moisture, &c., from which to draw supplies of nutriment, for the future growth of the plant." Mr. McCrary supposes it occurs in all localities, and is the nature and habit of the plant. In this, he is probably correct.

4. If the stalk be cut from the tubers, before this evidence of maturity has appeared, the necessary supplies of nutrition will be arrested, their proper growth will cease, and an effort will be made to repair the injury, by sending out small lateral tubers, from which weak and unhealthy stalks will proceed, at the expense of the original tubers. (See Figure 2.) All will ultimately perish, either by the droughts of autumn or the cold of winter.*

5. The tubers, together with one or two of the lower joints of the stalk, remain fresh and green, during the winter, if left to take their natural course; but if, by any means, this green portion be severed, at any season of the year, the result will be the death of the plant. (See Figure 3.)

From the foregoing considerations it is concluded,

1. That Timothy grass cannot, under any circumstances, be adapted for pasture; as the close nipping of horses and sheep is fatal to the tubers, which are also extensively destroyed by swine.

2. The proper period for mowing Timothy is at any time after the process of desiccation has commenced on the stalk, as noted in Proposition 3. It is not very essential whether it is performed a week earlier or later, provided it be postponed till that evidence of maturity has become manifest.

3. All attempts at close shaving the sward should be avoided, while using the scythe, and, in gauging mowing-machines, care should be taken to run them so high that they will not cut the Timothy below the second joint above the tuber.

CONDENSED CORRESPONDENCE.

Statement of GEORGE W. HALL, *of Mormon Creek, California.*

Oats, barley, and wheat are our principal crops, the former being chiefly grown for hay. The seed required, per acre, to make good hay, is about 3 bushels; the average yield is 1½ tons.

Owing to the great drought, crops are lighter this season than usual; but I have over 50 tons of hay, from 45 acres, which sells readily for $60 a ton. Notwithstanding the high price of labor, $4 a day, my whole "rancho" will net me over $50 an acre.

* Florists know that if the stalk of the white lily be cut, prematurely, a similar result ensues; and that, by cutting off the stem and leaves of herbaceous peonies, before they are mature, the tubers will be so much impaired as to fail to bloom the next season.

Statement of STEPHEN N. LINDLEY, *of Monroe, Jasper county, Iowa.*

Timothy seed is raised in great quantities in Lee and Henry counties, and has been, for several years, one of our chief articles of export. As many as 400 acres have been cut, on one farm, for seed; and many of our farmers cut from 60 to 100 acres annually. Before the seed is cut, buyers, or their agents, are actually bidding for the crops.

The soil of this part of the State is better adapted to Timothy than most portions of the prairie country, being more firm, and not so light. The most common mode of sowing is with oats or spring wheat, though it is sometimes sown in the fall, when the stubble is burnt off, and the seed harrowed in, at the rate of a peck to the acre. The grass is allowed to become fully ripe before cutting, which is done with a reaper, as no progress could be made with a cradle. When cut, it is bound in large sheaves, and allowed to stand until the seed begins to drop from the outside heads. It is then threshed, and the hay immediately stacked. When this is done, and salt has been added, at the rate of 15 or 20 pounds to a ton, it makes good second-rate hay; better for any kind of stock than straw. Some farmers think the hay will pay the cost of cutting, threshing, and cleaning. The average yield of seed is 6 bushels to the acre, which is worth from $2 to $2 50 per bushel. As land is cheap, and labor dear and scarce, with us, no crop will pay better while the present prices continue. Eastern farmers prefer our seed, from the fact that many of the noxious weeds that infest their meadows are unknown here, and the high price of hay there makes it more profitable to buy their seed.

The following is a correct estimate of the cost of 10 acres of Timothy:—

Interest at 10 per cent. on the cost of 10 acres of land, at $15,	$1 50
Cutting, 50 cents per acre,	5 00
Five hands to bind, including board,	6 25
Threshing and cleaning seed,	15 00
Stacking hay, including salt, and board,	7 00
	34 75
To meet this, we have 60 bushels of seed, worth, at the average price, $2 25 per bushel,	$135 00
Ten tons of hay, worth $3 per ton,	30 00
	165 00
Deduct expenses,	34 75
Net profit,	130 25

Statement of L. E. DUPUY, of *Shelbyville, Shelby county, Kentucky.*

One of our most valuable crops is blue-grass, which we get for the sowing, without any cultivation. We sow with clover, on wheat or

rye, 3 bushels of seed to the acre. The first season will produce a good crop of clover, which will be succeeded by the blue-grass. When this is well set, our farmers realise from $5 to 10 an acre, in grazing stock; and, at the same time, the land is increasing in fertility so fast, that, in a few years' grazing, to make it yield from 60 to 75 bushels of corn to the acre.

One great advantage of blue-grass is, that, if the stock is kept from it during the summer, the grass will remain equally as valuable for winter grazing.

Statement of J. B. GILMER, *of Pineville, Bossier parish, Louisiana.*

The "mesquit" is not a native of this vicinity. I introduced it from Western Texas some ten years ago, and can speak more highly of it than of any other grass with which I am acquainted. It stands the cold of winter well, is annual, and reproduces itself from its seed with the certainty of "crop-grass."

The "grama" grass is indigenous to this immediate region, grows in great abundance, is a strong, hardy, coarse grass, and occupies a low position in its native state. Something in the way of rough hay for cattle might be made of it, by cultivation, and cutting while young. The mesquit-grass will ripen its seed, in this latitude, from the 15th of May to the 15th of June, but the grama-grass, not before August; consequently, the mesquit will be forwarded several months in advance of the grama-seed.

The proper time for sowing the mesquit is September; the grama, I think, in the spring. For sowing mesquit, let the land be well ploughed; then brush or harrow the seed in lightly. The grama-grass will come up and grow well under any mode of culture.

Statement of JOHN B. C. GAZZO, *of La Fourche parish, Louisiana.*

The Bermuda grass, (*Cynodon dactylon,*) in this State, far excels the celebrated Kentucky blue-grass, either for summer or winter pasture. It is propagated by inoculating the turves, or sods, of the roots. The ground is put in thorough order, if intended for the meadow, and harrowed quite smooth after deep ploughing. The turves, or a few joints of stems and roots, planted in squares of 2 or 3 feet in dimensions, quickly cover the ground.

For hay-making, this grass will yield more than double the return of nutritious fodder than any other grass of this locality.

Statement of SAMUEL J. FLETCHER, *near Winchester, Clark county, Missouri.*

Timothy hay does well here. It is worth about $10 a ton in the stack. I bale and ship mine to St. Louis, where it netted me last year $20 a ton.

Statement of D. R. STILLMAN, *of Alfred Centre, Alleghany county, New York.*

The principal grasses cultivated in this section, for hay, are Timothy (herds-grass) and red clover, which are generally grown together in the same field. Two tons of good hay to the acre is the maximum yield; for when it grows sufficiently large to exceed that amount, it deteriorates in quality. The average yield will not much exceed a ton to the acre; and half a ton is probably the least that will pay the cost of production.

The cost of raising a ton of hay is about $4, and it will sell here for $6. The cost of transportation to New York, by railroad, is $12 a ton.

Statement of JAMES TAYLOR, *of Murphy, Cherokee county, North Carolina.*

The evergreen-grass, a sample of which I have sent to the Patent Office, is very good for pasturing, through the fall and winter. I have no knowledge of its origin. It will do best when sown on dry land, and is well adapted for sheep. It grows well on rocky soil, to the height of 4 or 5 feet, when ripe, continuing green, in the spring, and affording fine herbage, throughout the winter. It is best to sow in the spring with oats. A peck of well-cleaned seed is sufficient to put on an acre, or a bushel in the chaff. It ripens by the 1st of June, or a little before rye harvest, and is cut with a scythe and cradle, as we cut rye. If sown in the spring, this grass will not come to seed before the next year. If sown in the fall, it will bring seed the following spring. I do not know its yield of hay to the acre, but believe it to be equal to that of any grass we have.

Statement of JOHN P. HALLER, *of Lima, Allen county, Ohio.*

The principal varieties of grass raised in this county are Timothy, clover, and red-top, all of which do well. Timothy does best on the lower grounds, but clover should be sown on those which are elevated and dry. The average yield of hay is about 1½ tons to the acre.

Clover-seed is a considerable product of exportation.

Statement of JAMES MCK. SNODGRASS, *of Mifflin, Alleghany county, Pennsylvania.*

Clover and Timothy are our principal grasses. They produce well when sown separately, but make the best meadow and pasture when about equally mixed, which, on good soil, and under favorable circumstances, will yield over 2 tons to the acre, though 1½ tons is an average yield.

The fields are kept in meadow, or pasture, three or four years. We then plough deep, during winter or early spring, and plant corn, and

the next season oats, followed by wheat and grass seeds. By this mode, our land is kept in a state of continual improvement. Land that has been exhausted by careless or injudicious farming has by this renovating process been brought, in a short time, to a good state of cultivation and improvement.

Statement of JOHN F. BENNETT, *of Pittsburg, Alleghany county, Pennsylvania.*

About two years since, I obtained from the Patent Office a small parcel of "Alfalfa" seed, the lucerne grass of the Andes. I sowed it on the highest "knoll" on my farm, which is about 600 feet above the river, or about 1,250 feet above tide-water. This knoll was chosen as being poor ground, with a thin soil of about 9 inches, on the top of a marly sand-rock, the latter, however, being shaly and easy of disintegration. The alfalfa readily came up, and promised well. Through all that long, dry summer, it continued to grow, and almost flourish. In July, it gave a few blossoms, and in August ripened a part of its seed, which I carefully gathered and preserved. It lived through last winter and has flourished during the last season. In May last, about six weeks after the seed was sown, I had weeded the ground, just about the time the last rains came on. This, of course, was injurious, as it turned out; for, as no more rain fell during the summer, the scattered stalks thereby had to bear the whole brunt of the scorching sun.

I was so much pleased with the alfalfa, that I got a merchant to procure me, from Chili, about 40 pounds of this seed, which reached me in March last. After giving away a part of it for distribution among my farming friends, and distributing a few half pounds among my neighbors, I sowed 4 acres of good land with it amongst spring oats, which, this favorable season, have flourished exceedingly well, growing, after the oats were cropped, to a height of 21 to 24 inches, and yielding nourishing food to the cattle that were turned into it.

For some years back, owing to the irregular weather in the winters, sudden freezings and thawings, most of the clover sown in this neighborhood had perished, each new sowing of clover seeming to fare worse than the preceding one. This grass seems to be independent of the extremes of heat and cold, wet and dry, sending down its roots so deep that heat cannot scorch it, nor cold freeze it.

Statement of RICHARD LECHNOR, *of Stouchburg, Berks county, Pennsylvania.*

Timothy, with us, is generally sown in the fall, either broadcast after the harrow, or by means of a Timothy sower attached to the drill. Clover is then applied, in the spring, towards the end of March; some, however, sow as late as the middle of April. Early sowing is preferable, as that which is young will more readily scorch by the

parching rays of the sun in July and August, than it will be destroyed by late spring frosts. The quantity sown varies from 5 to 8 quarts of clover, and about half the amount of Timothy, to the acre. It is considered best to have the grass well mixed with different varieties; they should be sown sufficiently thick to exclude all foul plants or weeds. Clover is believed to be one of the best grasses, on account of its exuberant growth, and its fertilising properties, being excellent for pasturage, and a good renovator of the soil. In wet lands, Timothy is generally preferred to clover, as it is less subject to winter-kill.

The yield per acre varies from 1 to 3 tons, according to the richness of the soil and the nature of the season. The cost of growing hay is about $6 a ton; the present price, $24 a ton.

Statement of NATHANIEL GREEN, *near Middletown, Newport county, Rhode Island.*

The hay-crop on this island is of great value to our farmers. They generally mow over less surface than formerly, yet they obtain as much or more hay to the acre, by top-dressing their fields with manure once every two or three years.

The principal grasses cultivated are Timothy, clover, red-top, and "Borden's grass." All of these are often sown together, in the same field, and thrive well. Clover and Timothy, the first year, generally gain the ascendancy over the other kinds. The second year, Timothy and red-top come in together, and Borden's grass comes as the other two run out. Clover seldom lasts more than one year; Timothy two or three years; red-top and Borden's grass generally remain until the land is re-ploughed.

"White weed," otherwise called the "Daisy," comes in when the grass seeds are sown and fail to take root. When cut, at the time it first begins to shed its blossoms, and properly cured, it makes very good fodder; and, instead of being a pest to the fields, as has been the case in other parts of the country, it is here considered an acceptable visiter. It seldom appears where the grasses take root and grow well, but seems to be a "volunteer" to supply their places. Sometimes, a ton or more is obtained to the acre, while the grasses yield from 1 to 2 tons. Mowing-machines are now employed here with success.

The price of hay, delivered at Newport, is from $18 to $20 a ton.

WILD RICE.

CONDENSED CORRESPONDENCE.

Statement of JOHN B. C. GAZZO, *of La Fourche parish, Louisiana.*

The "Water oat," or "Wild rice," (*Zizania aquatica*,) is an interesting plant, exceedingly prolific, the roots of which are perennial. It grows at the edges of our prairies and bayous. Stock of every description are fond of it, when green or cured as hay. The first settlers of Louisiana called it *folle avoine*. It is also found wild in all the Southern States, grows tall, and will yield two crops a year of good hay.

THE JAPAN PEA.

CONDENSED CORRESPONDENCE.

Statement of JOHN B. LUCE, *of Fort Smith, Sebastian county, Arkansas.*

The package I now send, contains a part of the produce of a tablespoonful of Japan peas, planted on the 22d of June last. They were raised without any rain, not enough in a single shower to lay the dust, from the time of planting until after the first few pods had matured. The yield was half a bushel of choice seed. They were raised in a cotton-field, being planted singly, in the missing hills, and received the same treatment as the cotton.

The soil was a rich, sandy loam, in the Arkansas "bottom." I raised others in a very poor upland, in a peach orchard. They were planted in drills, worked but once, and suffered much from the shade, as well as from drought; yet the yield was fair.

Statement of JOHN DANFORTH, *of New London, New London county, Connecticut.*

In April last, I planted thirteen hundred and seventy-six Japan peas, from which I raised 4 quarts of seed. Some of the pea-vines I used as green fodder for my cattle.

Statement of ABRAM WEAVER, *of Bloomfield, Davis county, Iowa.*

I planted twenty-three of the Japan peas, I received from the Patent Office, of which number eighteen grew. They were cultivated

in my garden, on the 20th of May, and ripened, say from the 15th of August to the 15th of September. I planted them 3 feet apart, two peas in a hill, and, when fully grown, the branches were touching, the main stalk, attaining about 3½ feet in height. The summer was unusually dry. They were kept clear of weeds, but were not watered, except by rain, while growing. I am fully satisfied that, in an ordinary season, they would attain a height of 4 or 5 feet.

I think more bushels of these peas can be raised to the acre than of corn. I had some of them cooked, while green, at their largest size, and found them delicious. I am of opinion that a few acres, grown for the purpose of turning hogs in, to feed on them, before commencing to give them corn, would be a valuable crop. The stalk will stand as firmly as corn.

Statement of W. D. LINDSLEY, *of Sandusky city, Erie county, Ohio.*

On the 15th of May last, I planted a parcel of Japan peas in a rich, loose, sandy soil; but they did not all ripen before we were visited by frost. I planted others on the 31st of May, and again on the 15th of June. It is almost needless to say that none of the latter matured their pods. They should be planted in hills or drills, 4 feet by 3 feet apart, and one stalk in a place.

This pea is one of the most productive I have met with, and is well adapted for field-culture, as it has but one stalk, which sends forth numerous branches, every part of which are covered with pods well filled. It is not good for culinary use; but is excellent for domestic fowls and for stock. Poultry are remarkably fond of it, and fatten much more rapidly than when fed on corn.

THE OREGON PEA.

CONDENSED CORRESPONDENCE.

Statement of H. M. BRY, *of Monroe, Ouachita parish, Louisiana.*

The celebrated "Oregon pea," said to have been discovered in Oregon or the Rocky Mountains, a few years since, has been cultivated by me upwards of twenty-five years, and by my father about fifty years. He obtained the seed from the captain of a slaver, from the coast of Angola, a year or two after the cession of Louisiana; and it has been known and cultivated here ever since that period as the "Angola pea."

As I had seen miraculous statements concerning the Oregon for a year or two past, and as I had a great fondness for experiments, I, of course, was among the first to obt

seeds. As soon as I saw them, I was satisfied of their identity with the Angola pea; but, as I thought that I might possibly be mistaken, I cultivated them, and the result confirmed my previous opinion. As I have raised this pea for years, I can speak of its qualities: It is well adapted for the table, for hay, and for a fertiliser. It is undoubtedly a tropical plant, and, for aught I know, it would continue to bear for years from the same stalk. I frequently cut it for hay, when it began to form its seeds, before the coming of frost, when it is as full branches and leaves as at first.

Statement of GEORGE LUTHER, *of Longstreet, Moore county, North Carolina.*

I planted the Oregon peas, I received from the Patent Office, on the 28th of April. They came up and grew well for some time; but, on the 4th of August, when they were from 2½ to 5 feet high, we had a heavy squall, which blew them all down, and broke about half of them off at the ground. I thought for some time the roots would send up sprouts, but they did not. I offered some of those that were broken off to my cattle and horses, but none would eat them. I observed closely, to see if the branches come out at every joint, but in this I was disappointed, and they did not begin to bear until late in the fall, and then only bore pods on the extreme ends of the limbs, and these so late that a third part were destroyed by the frost, though the fall was mild.

The "Chinese" pea, from its size and color, could not be distinguished from the Oregon pea. I obtained a few plants from these, which were perfectly similar to the Oregon pea, until the stalk was about a foot high. They then began to blossom, and bore pods, which resembled those of the Oregon pea. They then sent out a number of vines, each of which bore at every joint. It was late in May when I received them. I planted some of the first that ripened, and they matured before frost. I think three, if not four crops of them, may be made here in one season.

Statement of WILLIAM H. GOUDY, *of Buteville, Marion county, Oregon Territory.*

There is no such product here as the "Oregon pea," described by a writer in the Report of 1853. There is an excellent field-pea, which was introduced by the Hudson Bay Company. It is a yellowish-white, and nearly the size of what is known as the "May" pea in the Western States. The stalks, when planted in good rich land, grow 4 feet high, sending out several lateral shoots, with short joints, which have from 2 to 4 pods at a joint, that seldom contain more than six peas.

What is known here as the "Field" pea will yield on good land 30 bushels to the acre. The peas are fed to hogs, and the vines make good hay.

Peas are considered superior to wheat to fatten hogs. The cost of raising is about the same as that grain.

Statement of VICTOR SCRIBA, *of Pittsburg, Alleghany county, Pennsylvania.*

The "Oregon" pea was cultivated here both in 1854 and 1855. In the former, on account of the great drought, it entirely failed. Last spring, I sowed mine about the middle of April, but a late frost killed nearly half the plants I had. The other half lingered for several months, seemingly not to grow at all, until the last of August, or early in September, when they grew more vigorously and commenced to blossom. The early frosts, however, about the middle of October, killed the unripe pods, stalks, and leaves in a single night. The stalk attained a height of only 2½ or 3 feet.

All the other Oregon peas cultivated in this vicinity, as far as I could learn, shared the same fate.

CHUFAS.

CONDENSED CORRESPONDENCE.

Statement of VICTOR SCRIBA, *of Pittsburg, Alleghany county, Pennsylvania.*

Last season, I raised a patch of the "Earth Almond," or "Chufa" (*Cyperus esculentus*,) each plant of which produced over one hundred tubers. In Europe, they are eaten raw, like chesnuts or almonds, and are used in cakes or confectionary like the latter; and, even when pounded with sugar, the mixture is equal in every respect to the emulsion of almonds. They are also used as the best substitute for coffee.

THE PEA-NUT, OR PINDAR.

CONDENSED CORRESPONDENCE.

Statement of JOHN B. C. GAZZO, *of La Fourche parish, Louisiana.*

The "Pea-nut," "Pindar," or "Ground-nut," (*Arachis hypogœa*,) when cultivated in this section, requires a good alluvial soil, although it will grow well on sandy land. The seeds are dibbled in rows, so as to leave the plants a foot apart each way. As soon as the flowers appear, the vines are earthed up from time to time, so as to keep them chiefly within the ground.

When cultivated alone, and there is sufficient moisture, the yield of nuts is from 60 to 75 bushels to the acre. If allowed to grow without earthing up, the vines will yield half a ton of hay to the acre. They are killed by the first frost, when the nuts are mature and ready for use.

CARROTS.

CONDENSED CORRESPONDENCE.

Statement of GERSHOM WIBORN, *of Victor, Ontario county, New York.*

Having had some experience in raising carrots for feeding to stock, I will give an estimate of the expense of raising and securing an acre. The ground should be rich and low, but thoroughly drained, and worked at least 15 inches deep, with a subsoil plough. It should be harrowed, rolled, and then formed into ridges 2 feet apart. The seed should be sown with a hand-drill, as early in the spring as the field can be properly worked, as an early sowing is far more likely to come up than a late one. Carrot-seed, of all others, requires a very damp, fine soil to vegetate.

An acre of suitable land, well worked, in general, will yield from 300 to 1,000 bushels of roots, the nutritive value of which, by measure, is equal to one-fourth of that of corn-meal.

The following is an estimate of the expense of cultivating:—

Ploughing and preparing, ...	$4
Seed, 3 pounds, ...	3
Drilling in the seed, ...	2
Hoeing first time, six days, . . .	6
Hoeing second time, six days, . . .	6
Hoeing third time, four days, . . .	4
Digging and housing, ...	10
Total, ...	35

MANGOLD-WURZEL.

CONDENSED CORRESPONDENCE.

Statement of O. H. KELLY, *of Northwood, Benton county, Minnesota.*

The seeds of the mangold-wurzel, which I received from the Patent Office, succeeded well and grew to a large size. A few of the roots were sliced, and given to my hogs, which they ate in preference to corn. I believe it to be a most valuable root to raise for stock-feeding, in general. I shall continue to cultivate it.

TURNIPS.

CONDENSED CORRESPONDENCE.

Statement of JOHN T. ANDREW, *of West Cornwall, Litchfield county, Connecticut.*

The several varieties of turnip-seed, sent me from the Patent Office in June last, were well cultivated, and the results observed with care. They were sown in drills, 18 inches apart, and 8 inches asunder, along the drills, allowing only one plant in a place to remain after thinning. The ground was kept loose, and free from weeds, by repeated hand-hoeings.

"Sutton's Improved Green Globe" proved good, germinated well, and produced uniform bulbs of middling quality, but not satisfactory in quantity, the yield being about 500 bushels to the acre.

"Ashcroft's Swede" came pure, germinated well, and grew with a healthy and rapid development. The quality of the bulbs was good and the yield fair, the product being about 800 bushels to the acre. The tops were very large, and of a dark green color.

"Lincolnshire Red Globe" proved excellent; the bulbs were white below the surface, purple above, and very large and unform. The quality was superior, being free from rootlets, smooth, solid, and, in every respect, perfect of its kind. The tops were very large, extending from the opposite extremities of its leaves 4 feet. The weight of the largest bulb, with its top, when pulled, was 15 pounds. The small parcel of seed was sown in a row 20 rods long, and produced 22 bushels.

This experiment justifies the hope that the Lincolnshire Red Globe will prove one of the best turnips known to us, and a great acquisition.

Statement of B. F. WIBUR, *of Monson, Piscataquis county, Maine.*

The "White globe," or "Norfolk" turnip, an English variety, I planted on the 1st of May, in drills 2 feet apart, on ground prepared as we usually prepare for our common field crop of ruta-bagas, and the yield was nearly double that of the ruta-baga by the side of it. Some few of the largest weighed from 10 to 15 pounds each. I shall continue to cultivate this variety, as it is decidedly better than the common English turnip, grown in this vicinity.

"Skirving's Improved Swede" was planted on the same plat, side by side with the above, and other field-crops, and does not appear to be any better than the common ruta-baga. The crown of the root is inclined to grow much longer, and the yield is no better.

Report of an experiment of twenty-six varieties of Turnip-seed, by SAMUEL D. MARTIN, *of Pine Grove, Kentucky, in* 1855.

	NAMES OF VARIETIES.	Time of sowing.	Soil.	Pounds per acre of roots.	Pounds per acre of tops.	Remarks.
1	Skirving's Swede	July 19	Garden	4,600	3,200	
2	Rivers' Stubble Swede	"	"	5,600	4,200	
3	Laing's Swede	"	"	4,800	2,000	Injured by freshet.
4	Green-topped Swede	"	"	.....	.....	Destroyed by freshet.
5	Dale's Hybrid	Aug. 8	Sod-land	4,960	12,800	
6	Green-topped Six-weeks	Aug. 1	"	14,000	6,400	
7	Snow Ball	"	"	6,000	6,200	
8	Strap-leaved	"	"	9,400	3,800	
9	Small Yellow Malta	"	"	5,600	2,800	Ground not filled.
10	White Globe or Norfolk White	"	"	8,600	7,200	" " "
11	Green Round or Norfolk Green	"	"	3,800	6,000	" " "
12	Green Globe or Green Norfolk	"	"	5,000	4,600	" " "
13	Golden Ball	"	"	4,800	3,200	" " "
14	Red Globe or Norfolk Red	"	"	6,800	13,000	" " "
15	White Tankard or Decanter	"	"	4,800	5,200	" " "
16	Green Tankard or Decanter	Aug. 8	"	2,400	5,600	
17	Yellow Tankard or Decanter	"	"	2,080	4,800	Ground not filled.
18	Red Tankard or Decanter	"	"	6,400	11,560	
19	Green-topped Scotch	"	"	3,040	5,600	
20	Purple-topped Scotch	"	"	2,720	4,480	
21	Skirving's Purple-topped Scotch.	Aug. 9	"	1,920	2,880	
22	Early Stone or Stubble Stone	"	"	5,080	16,000	
23	Yellow Stone	"	"	4,480	16,000	
24	Red-topped Stone	"	"	10,720	12,320	
25	White Dutch	"	"	.....	.....	Eaten by grasshoppers
26	Yellow Dutch	"	"	4,800	5,760	

The seeds were presented to the Patent Office, for experiment, by Messrs. Charlwood and Cummins, seedsmen, of London.

They were mostly sown upon sod-land, ploughed four times, harrowed twelve times, and rolled twice. Stable manure was spread broadcast at the rate of 160 bushels to the acre, finely pulverised; except to the Swedes, to which it was applied in drills.

The first sowing was almost destroyed by the turnip-fly, and the second by grasshoppers. Those which stood, were so much injured, that they grew very little before the weather became cool.

The Swedes were transplanted in drills August 4th.

The crop was harvested November 12th.

Report of an experiment of twenty-six varieties of Turnip-seed, by A. G. COMINGS, *of Freetown, Bristol county, Massachusetts, in* 1855.

	NAMES OF VARIETIES.	Time of sowing.	Time of harvesting.	Pounds per acre of roots.	Pounds per acre of tops.	Bushels per acre of roots.	Adaptation of roots to stock.	Adaptation of roots to culinary use.
1	Skirving's Swede	July 11	Nov. 5	50,500	8,000	720	excellent	
2	Rivers' Stubble Swede	"	"	44,500	8,000	640	"	excellent
3	Laing's Swede	"	"	44,500	7,000	640	"	
4	Green-topped Swede	"	"	60,600	6,500	880	"	excellent
5	Dale's Hybrid	July 24	Nov. 19	52,800	8,000	885	"	
6	Green-topped Six-weeks	"	"	28,000	4,480	560	"	very
7	Snow Ball	"	"	28,800	6,360	600	"	good,
8	Strap-leaved	"	"	38,500	4,800	700	"	early.
9	Small Yellow Malta	"	"	26,880	4,800	480	"	excel-
10	White Globe or Norfolk White	"	"	39,600	8,000	660	"	lent,
11	Green Round or Norfolk Green	"	"	26,400	7,360	440	"	early.
12	Green Globe or Green Norfolk	"	"	37,200	8,320	620	"	
13	Golden Ball	"	"	24,640	6,400	440	"	good.
14	Red Globe or Norfolk Red	"	"	27,000	9,280	500	"	
15	White Tankard or Decanter	"	"	20,800	5,760	400	"	fine
16	Green Tankard or Decanter	"	"	20,600	5,640	400	"	"
17	Yellow Tankard or Decanter	"	"	21,000	5,440	400	"	excellent
18	Red Tankard or Decanter	"	"	20,000	6,240	400	"	
19	Green-topped Scotch	"	"	15,600	6,400	260	"	
20	Purple-topped Scotch	"	"	14,400	7,040	240	"	
21	Skirving's Purple-topped Scotch	"	"	24,000	5,920	400	"	
22	Early Stone or Stubble Stone	"	"	19,200	6,400	320	"	
23	Yellow Stone	"	"	13,920	8,000	240	"	
24	Red-topped Stone	"	"	37,120	7,040	640	"	
25	White Dutch	"	"	25,920	7,200	480	"	
26	Yellow Dutch	"	"	11,520	4,000	240	"	

The seeds were presented to the Patent Office, for experiment, by Messrs. Charlwood and Cummins, seedsmen, of London.

The soil was a sandy loam, from which a hay-crop was mown on the 25th of June, when it was ploughed for the turnips.

Eight cords of stable manure and 300 pounds of phosphate of lime, were used to the acre.

The crop was severely injured by drought from the 1st of August.

Report of an experiment with twenty-six varieties of Turnip-seed, by CHARLES A. NASON, *of Hampton Falls, New Hampshire, in* 1855.

	NAMES OF VARIETIES.	Time of sowing.	Pounds per acre of roots.	Pounds per acre of tops.	Bushels of roots per acre.	Adaptation of roots to stock.	Adaptation of roots to culinary use.	Quality for keeping.
1	Skirving's Swede	June 27	28,665	8,190	375	excellent.		good.
2	Rivers' Stubble Swede	"	43,695	13,650	874	good.		"
3	Laing's Swede	"	25,995	5,460	345	"		"
4	Green-topped Swede	"	28,665	6,825	580	"		"
5	Dale's Hybrid	July 15	19,110	23,205	385	"		
6	Green-topped Six-weeks	"	31,395	10,920	627	"		
7	Snow Ball	"	31,406	16,380	628	"		
8	Strap-leaved	"	45,045	16,380	900	"	good.	
9	Small Yellow Malta	"	20,475	5,460	409	"		
10	White Globe or Norfolk White	"	36,855	18,110	737	"		
11	Green Round or Norfolk Green	"	30,030	5,460	601	"		
12	Green Globe or Green Norfolk	"	32,760	12,285	655	"		
13	Golden Ball	"	28,665	8,190	573	"		
14	Red Globe or Norfolk Red	"	23,205	19,110	464	excellent.	bad.	
15	White Tankard or Decanter	"	16,380	6,825	328	good.	inferior.	
16	Green Tankard or Decanter	"	28,935	16,380	519	"	"	
17	Yellow Tankard or Decanter	"	31,395	17,745	628	"		
18	Red Tankard or Decanter	"	19,110	12,285	382	"		
19	Green-topped Scotch	"	20,475	13,650	410	"		
20	Purple-topped Scotch	"	16,380	11,285	328	"		
21	Skirving's Purple-topped Scotch.	"	17,745	9,555	555	"		
22	Early Stone or Stubble Stone	"	19,110	8,190	582	"		
23	Yellow Stone	"	28,665	5,460	573	"		
24	Red-topped Stone	"	21,840	6,825	457	"		
25	White Dutch	"	27,300	9,190	546	"		
26	Yellow Dutch	"	21,840	6,825	457	"		

The seeds were presented to the Patent Office, for experiment, by Messrs. Charlwood and Cummins, seedsmen, of London.

The soil was generally gravelly loam, made light and fine, but sometimes inclined to clay. The high, dry gravelly land did not answer so well as moister soils. The seed was drilled in about 18 inches apart. The plants were weeded once or twice and thinned out from 5 to 8 inches asunder.

The fertiliser used was a compost consisting of 20 parts of barn-yard manure, 8 parts of salt-marsh mud, 8 parts of hog-manure, 3 parts of wood ashes, and 1 part of lime—the whole well pulverised and worked together, and applied at the rate of 25 cords to the acre, well harrowed and intermixed with the soil.

The roots were more or less affected by drought, according to the situation of the soil.

The crop was but little injured by insects.

Time of harvesting, October 15th.

Report of an experiment with twenty-six varieties of Turnip-seed, by JOSEPH J. COOKE, *of Providence, Rhode Island, in* 1855.

	NAMES OF VARIETIES.	Time of sowing.	Pounds per acre of roots.	Pounds per acre of tops.	Bushels of roots per acre.	Adaptation of roots to stock.	Adaptation of roots to culinary use.	Quality for keeping.
1	Skirving's Swede	July 21	17,587	12,395	335	good.	good.	good.
2	Rivers' Stubble Swede	"	18,656	13,199	352	"	"	"
3	Laing's Swede	"	18,304	10,586	352	"	"	"
4	Green-topped Swede	"	16,432	8,978	301	"	"	"
5	Dale's Hybrid	"	11,809	18,961	251	"	fair.	fair.
6	Green-topped Six-weeks	"	24,276	16,312	476			inferior.
7	Snow Ball	"	15,239	19,705	311	good.	good.	"
8	Strap leaved	"	19,894	17,063	406	"	"	"
9	Small Yellow Malta	"	13,728	10,343	264	poor.	poor.	poor.
10	White Globe or Norfolk White	"	15,239	26,274	311	good.	good.	fair.
11	Green Round or Norfolk Green	"	9,984	21,706	208	poor.	poor.	"
12	Green Globe or Green Norfolk	"	17,000	20,611	340	good.	good.	"
13	Golden Ball	"	15,704	15,855	302	"	"	inferior.
14	Red Globe or Norfolk Red	"	14,150	25,821	283	"	"	"
15	White Tankard or Decanter	"	14,716	16,081	283	poor.	poor.	very inferior.
16	Green Tankard or Decanter	"	16,050	24,009	321	"	"	"
17	Yellow Tankard or Decanter	July 23	16,308	18,044	302	"	"	"
18	Red Tankard or Decanter	"	16,308	20,460	302	"	"	"
19	Green-topped Scotch	"	9,350	17,365	170	good.	good.	fair.
20	Purple-topped Scotch	"	8,694	19,403	189	"	"	"
21	Skirving's Purple-topped Scotch.	"	11,577	16,534	227	"	"	"
22	Early Stone or Stubble Stone	"	14,798	17,742	302	"	"	"
23	Yellow Stone	"	12,985	16,383	245	"	"	"
24	Red-topped Stone	"	22,650	14,986	453	"	"	"
25	White Dutch	"	21,700	13,967	434	"	"	"
26	Yellow Dutch	"	13,464	9,626	264	"	"	"

The seeds were presented to the Patent Office, for experiment, by Messrs. Charlwood and Cummins, seedsmen, of London.

The soil was a sandy loam, which had been highly manured in the spring for spinach, and subsoiled to the depth of 18 inches.

There were applied 560 pounds per acre of Lloyd's super-phosphate of lime.

All the varieties were more or less injured by worms.

The crop was harvested November 22d.

The plants were carefully thinned and weeded, and promised an abundant yield until the drought was far advanced, before the expiration of which their recovery, in case of rain, seemed doubtful. They did revive, however, and continued to grow up to about the time of harvesting.

COLZA, OR RAPE.

CONDENSED CORRESPONDENCE.

Statement of JAREB CASE, *of Troy, Bradford county, Pennsylvania.*

On the 19th of April last, I received a small can of "March" or spring colza, or rape-seed. The same day, I sowed a part of it on a plat of sandy loam 30 feet square, well enriched with hen-dung and barn-yard manure. On the 1st of September, I harvested 3 pecks of seed of excellent quality.

On a rich mellow soil, free from grass and weeds, where labor is cheap, I think this crop will pay.

MISCELLANEOUS CROPS.

TOBACCO.

CULTURE IN RUSSIA.

The culture of tobacco has attained some degree of importance in Russia, principally in the governments of Tschernigow, Saratow, and Poltawa. It has also of late begun to extend itself into several provinces of New Russia, in the government of Stavropol, in Podolia, in some of the central governments, and even into some parts of Siberia.

In the Report of the Department of Economy to the Ministry of Domains, published in 1849, the total production of tobacco in Russia, including the trans-Caucasian provinces, is estimated at upwards of 108,240,000 pounds. In the last-named provinces, notwithstanding the favorable nature of the climate, the tobacco plantations are but inconsiderable, the quantity grown annually not exceeding 1,000,000 pounds.

The greater part of the tobacco raised in Russia is of a very ordinary quality, selling at from 40 to 80 kopecks per pood (from 1 cent and 1 mill to 2 cents and 2 mills a pound); but this cheapness has diffused a taste for it throughout the lower classes of the population, including even the Nomadic tribes of Atrakhan and Siberia, as well as the natives of the Aléoutic islands. Down to the year 1842, the culture of an article of a better quality was confined to a few isolated experiments, which, however, served to afford an indication of classes most suitable for the different districts. By way of encouraging and promoting these attempts, the Department of Rural Economy periodically imports tobacco-seed from Persia, Turkey, Cuba, and the United States, which it distributes gratuitously in every part of the empire where the inhabitants manifest a desire to

introduce plantations, and especially among the best known planters and colonists of New Russia. In the space of five years, there have been distributed upwards of 600 pounds, a quantity sufficient to plant 32,000 acres. Treatises with suggestions on tobacco-culture have likewise been published and distributed in considerable numbers, with a view to instruct the cultivators. In order to facilitate sales, the Department of Rural Economy, has by its own intervention, put the producers in communication with the principal manufacturers; it also quite recently despatched a distinguished agriculturist with a commission to visit Turkey, Egypt, the south of Europe, the island of Cuba, and the United States, to study the culture of tobacco in those countries, and, on his return, to visit Holland, the countries of the Rhine, and the central parts of Germany, in order to examine the various modes of manufacturing tobacco and snuff. This agent was charged at the same time to engage in Germany an experienced cultivator to assist in introducing the best modes of culture, both into the agricultural schools, and amongst private planters. In the meantime, experimental plantations were introduced into all the model farms and horticultural establishments of the crown. The good effect of these measures has already been felt, especially during the last six or seven years, in New Russia, Bessarabia, and the governments of Podolia, Kiew, and Pultawa. In Podolia, it is stated that some proprietors have obtained seed from America, of an excellent variety, suitable for the manufacture of cigars; and, in Bessarabia, the crown peasants of the district of Khotin have begun to cultivate the better sorts.

As for the superior qualities of the tobacco of the Russians, there seems little chance, however, that they will be able entirely to supersede the kinds they now receive from Turkey and America; but the experiments already made have shown that the culture of these sorts may succeed up to a certain point in several districts of Little Russia and the Southern Provinces, if the culture be rationally pursued and care taken to renew the seed. D. J. B.

CONDENSED CORRESPONDENCE.

Statement of D. BARNES, *of Middletown, Middlesex county, Connecticut.*

A considerable quantity of tobacco is raised in Cromwell and in this town; the yield is good and pays well. It is also considered of superior quality both at home and abroad.

Statement of DANIEL PATERSON, *of Fayette, Howard county, Missouri.*

Tobacco, in this region, yields about 1,000 pounds to an acre. Price from $4 to $5 per 100 pounds; cost of conveying to market, 15 to 25 cents per 100 pounds.

SUGAR AND MOLASSES.

FAILURE OF THE SUGAR-CANE IN LOUISIANA—PROPOSED PLAN OF RESTORATION.

The culture of sugar-cane in Louisiana, it is well known, has been subject from the period of its introduction in 1751* up to the present time, to certain unfavorable vicissitudes to which it is not liable in more southern climes. The past has been more marked, perhaps, than any preceding season, both in respect to the amount produced and to the diseases and condition or degeneracy of the cane. The spring of 1854 is represented to have been so extraordinarily dry that most of the cuttings put into the ground perished, even after they had vegetated. Indeed, some few sections only of the sugar-growing parishes were favored even with occasional vernal showers, and the crops in these sections gave better promise than those in other parts of the State. But yet in these, the yield was not abundant, as the summer and fall proved otherwise unfavorable to the growth and maturity of the cane; and many planters, who had crops of fair appearance, found, upon grinding and boiling, that the actual yield of sugar to the acre was unusually small. The plant-cane, upon which the cultivators mainly depend, seems to have been a general failure throughout the State; and the small crop made was mostly saved from the stubbles, or rattoons. The securing of the crop was also very unfavorable to the planter. At the commencement of the grinding, there appeared to be little or no crystalisable sugar in the juice. The cane was not ripe, and the cold and unusually wet winter, which consequently required a large amount of fuel for boiling, was a great drawback; so much so, that many of the planters lost a good portion of their crops by not being prepared for these exigencies, while others, rather than grind their immature cane, preferred to let it stand in the fields, even at the risk of losing a part, and did not commence boiling before the 20th of December.

On the night of the 23d of October, there occurred a frost, and although not very severe, it did a vast deal of injury to the cane in the parishes of St. John Baptist, St. James, Ascension, Iberville, East and West Baton Rouge, West Feliciana, Point Coupée, Avoyelles, and Rapides. The season in these parishes was shorter by two months than in the others, where the cane was perfectly sound up to the night of the 25th of December, when thick ice was formed, the

* We have no record of the cultivation of sugar-cane as a staple crop, in any part of the territory of the United States, before the year 1751, when it was introduced, with several negroes, by the Jesuits, from St. Domingo. They commenced a small plantation on the banks of the Mississippi, just above the old city of New Orleans. The year following, others cultivated the plant, and made some rude attempts at the manufacture of sugar. In 1758, Mr. Dubreul established a sugar estate on a large scale, and erected the first sugar-mill in Louisiana, in what is now the lower part of New Orleans. His success induced other plantations, and, in the year 1765, there was sugar enough manufactured for home consumption; and in 1770, it had become one of the staple products of the colony. Soon after the revolution, a large number of enterprising adventurers emigrated from the United States to Lower Louisiana, where, among other objects of industry, they engaged in the cultivation of cane, and, by the year 1803, there were no less than eighty-one sugar estates on the delta alone.

ground frozen, and a longer term of cold weather followed than had ever before been experienced in that section, and continued, with variations of temperature and frequent rains, up to the middle of February. In several years previous, as in 1835 and 1852, for instance, the temperature, for a day or so, had fallen to as low, or a lower point; but, probably, so great an aggregate of cold had never been known in Louisiana in any previous winter. The greatest cold was on the morning of the 4th of February, when the mercury fell to 20° F., although it stood as low as 24° or 25° on several days in January. Many planters had not finished sugar-making when the severe weather set in, and all such, from these untoward circumstances, suffered much from short crops.

While the cane of the first-named parishes was nearly paralysed with cold on the 24th of October, it was not quite frozen to the ground; but, in cases where it had not been "windrowed," it continued to sprout, and was thus prevented from ripening, while that which was windrowed was susceptible of being made into nothing but molasses. To this frost, may be attributed, in a great degree, the large deficiency of the sugar-crop in the State, the past season. But this evidently was not the only cause of the general deterioration of the cane which had manifested itself for several years preceding. There had not only been a less yield of sugar to the acre than formerly, but the cane itself had become feeble or diseased on many plantations, and the stalks attacked by borers, or worms; and the juice, in many cases, was not susceptible of conversion into sugar. These defects, it is conceived, are not attributable alone to untimely frosts, nor to seasons otherwise unfavorable, but mainly to injudicious cultivation, such as the neglect of proper drainage, and, more than all, the exhaustion of the requisite elements in the soil necessary for the perfect development of the cane, by continued cropping, without a due regard to rotation. This point, however, will be discussed more at length hereafter.

This deterioration, or falling off of the crop, has also been attributed to other presumed causes, one of which is that based upon the theory of Mr. Knight, of Herefordshire, in England, in the latter part of the last century, namely, that plants propagated by cuttings, or slips, deteriorate and become extinct, unless regenerated from time to time by the production of fresh stocks directly from the seeds. Mr. Knight, it would seem, based his hypothesis upon the fact that certain varieties of the apple, in his neighborhood, were believed to be running through their natural course, and named as instances the "Golden Pippin" and the "Nonpareil." But the particular cases thus cited failed to sustain his assumption; for the Golden Pippin is believed still to thrive well at Madeira, on many parts of the Continent of Europe, and in England, as well as the Nonpareil, just as they did in the days of Queen Anne.

The earliest records we have of the sugar-cane (if we except a slight allusion by the prophet Job) are found in the writings of authors who lived three centuries before the Christian era. From them, we simply learn that the history of this plant, like that of many other necessaries of life, was involved in obscurity. The plant

itself indeed appears to have been imperfectly known, even to the Greeks and Romans, as Theophrastus, 320 years before Christ, described it as a "sort of honey extracted from canes or reeds;" and Strabo, on the authority of Nearchus, the commander of the fleet in the expedition of Alexander the Great, says that "reeds in India yield honey without bees;" but, although India and Cochin-China are the countries usually cited as the native homes of the sugar-cane, it is stated by Dr. Roxburgh, who resided many years in India, that its indigenous *habitat* in that country is unknown, and that he never there beheld its seeds. Although it has been stated also to grow wild upon portions of the American Continent, no proof of the fact is believed to exist. It is true that a species of cane, of spontaneous growth, has been found in Central America, which is rich in saccharine juice, and easily crushed by rollers; but it is not known with certainty when it was discovered, nor whether or not it is the result of self-sown seeds of some variety of the Eastern cane. On several of the South-sea Islands, however, and especially Otaheite, it occurs in an apparently wild state.

The cultivated sugar-cane very rarely produces seeds, although this is said sometimes to occur even in the Southern States of this Union; but it has not been shown that the seeds have vegetated when sown; yet there is, no doubt, some country in which the course of nature is followed in this respect. Moreover, it has been averred that there is no region in which the cultivators attempt to resort to this mode of propagation, their dependence being always and entirely upon the cuttings. The theory, therefore, of the insufficiency of this means of propagating the sugar-cane, is without the least foundation, unless it can be shown that a general tendency to decay and extinction is manifested in it throughout the globe—a fact that has not been assumed, and that certainly does not exist.

That the propagation of plants, by their seeds, is the natural method, seems like an infallible proposition; and to the inquiry it naturally suggests respecting their design, if not for this use, it may be difficult to find a conclusive reply. But the vegetable kingdom presents to the mind of the observer so many apparent anomalies, that the student who refuses to progress further until each in succession is made plain to his understanding, is not likely to proceed far in this most interesting and profitable pursuit.

The red currant, it is well known, contains seeds; but, although its history can be traced for at least a thousand years, there is no reason to believe that, in all this period, it has ever been generally propagated otherwise than from cuttings.

The grape, also, contains seeds; but vines are never propagated from them, except when new varieties are intended to be produced. The extraordinarily healthy and prolific vines of California were introduced there from Malaga, in the form of cuttings, more than one hundred and fifty years ago. How long they had been so cultivated in Malaga, prior to that time, it is impossible to tell; but, it is presumed, that a very long period had elapsed since they had been derived from the seeds. It may also be presumed that these vines of California are not more youthful, in this respect, than those now grow-

ing at Malaga, notwithstanding that feebleness or disease is evinced in the latter, which must proceed from some cause not common to the vines of both countries.

The Jerusalem artichoke has been cultivated from time immemorial, in Europe, by the tuber alone, as has also the tiger lily, for a great number of years. The yellow sweet-potato, which has always been healthful, abundant, and of excellent quality, with us, has never been known to bear seeds, nor even to flower, in this country, at least; and, although the other varieties of the sweet-potato, purple and white, do bear seeds, they are very rarely, or perhaps never, resorted to for the purpose of general propagation. The same remark is true of the common potato of the North; and, when, a few years ago, this esculent became diseased, the idea of exhaustion was forcibly impressed upon the public mind, and, in compliance with the general desire, the London Horticultural Society obtained from the mountains of Peru the seeds of the wild plant, similar to those from which the European varieties had originally been produced; but, while all endeavors to derive a new race from this source proved wholly futile, the old varieties, that had long been propagated by cuttings, or tubers, and were regarded as exhausted, regained their former healthfulness, and became as fresh and vigorous, in all their characteristics, as they had ever been, for three centuries before.

The instances here cited may not be sufficient to prove that plants propagated by cuttings, or slips, are inexhaustible and perpetual in their succession, and certainly do not prove that they are not liable to disease, or, at least, as liable as they would have been had they been produced from seeds, but they go far towards dissipating the conjecture they are presented to oppose.

It is an unfortunate, though very prevalent error, to attribute the diseases of plants to other than the real causes, since, by doing so, we deprive ourselves of the ability to apply the remedy appropriate to each case. A deficiency or excess of rain, heat or cold, the electric state of the atmosphere, and, what is still more likely, an unfavorable condition of the soil, doubtless more or less induce the diseases or debility of plants; and these may be either local or general. In the case of the sugar-cane of Louisiana, for instance, although it is highly desirable to introduce cuttings of new, and, if possible, better varieties, than are now cultivated in that State, there is a probable cause of deterioration to which the attention of planters has not been effectually directed.

It is known that the continued production of a single species of plant, upon almost any soil, will eventually exhaust that soil of those elements especially required as the pabulum of that plant, if those elements be not carefully ascertained and systematically returned. Is not this probably the case with respect to the sugar-fields of Louisiana? Chemical analyses have shown that nearly one-half of the inorganic matter contained in the cane itself is phosphate of lime, and nearly a fourth silica. The bare statement of this fact must assuredly suggest to every mind a prominent cause of the evil. In the continued culture of sugar upon the same lands, as of everything else, a judicious system of rotation, with a liberal supply of

guano, or other animal and phosphated manure, in connection with a due supply of well decomposed vegetable matter, is essential; and, as has been intimated, the latter must be of the kinds specifically indicated.

That there has been a degeneracy in the cane, caused by exhaustion of the soil, and injudicious rotation, is obvious, from the fact that the same lands which have been under cultivation for a long period have yielded more than three times the amount of sugar to the acre in some years, than in others, the productiveness having been in those cases in which the soil was in its primitive fertility, or when enriched by guano, or other appropriate manures. For instance, the British and French West India Islands, some sixty or seventy years ago, yielded from 3,000 to 6,000 pounds of sugar to the acre. At present, they do not yield a third of this amount, without manure. The product in Louisiana, formerly, often reached as high as 3,000 or 4,000 pounds; and, in some cases, even to 6,000 pounds; but, for the last few years, it has often ranged as low as from 500 to 1,000 pounds to the acre. According to Commodore Perry, in his "Expedition to Japan," before the introduction of guano into Mauritius, the product of sugar on that island was from 2,000 to 2,500 pounds to the acre; but the increase, since the application of this fertiliser, has been so extraordinary as to be scarcely credible. In ordinary seasons, the product has been from 6,000 to 7,000 pounds, and, under peculiarly favorable circumstances, it has even reached 8,000 pounds to the acre.

The amount of raw sugar, as a gross produce, to the acre, in several countries of the globe, from good authorities, is as follows:—

	Pounds.
Mauritius,	6,000
Brazil,	5,000
Cuba,	4,000
Isle of Bourbon,	3,300
Guadeloupe,	2,000
Vera Cruz,	1,900
Martinique,	1,700
Bengal,	1,600
St. Domingo,	1,100
Louisiana,	1,000

In order to show the fluctuations of the sugar-crop in Louisiana, for the last twenty-eight years, the following table is taken from Mr. Champomier's Report, in which a hogshead is estimated to contain 1,100 pounds:—

Crop of	Hogsheads.	Crop of	Hogsheads.
1855	231,427	1847	240,000
1854	346,635	1846	140,000
1853	449,324	1845	186,000
1852	321,934	1844	200,000
1851	236,547	1843	100,000
1850	211,201	1842	140,000
1849	247,923	1841	90,000
1848	220,000	1840	87,000

Crop of	Hogsheads.	Crop of	Hogsheads.
1839	115,000	1834	100,000
1838	70,000	1833	75,000
1837	65,000	1832	70,000
1836	70,000	1829	48,000
1835	30,000	1828	88,000

In seeking a remedy for the evil here complained of, in Louisiana, the minds of many have very naturally been turned to the project of replenishing the cane-fields of that State, by the importation of a fresh supply of cuttings, of such varieties as may be found best suited to the soil and climate. Resort to this means of restoration should be promptly made, on a liberal and extensive scale, so that the experiment may be thorough, and, if possible, effectual, in its results. An intelligent agent should be selected for the purpose, well acquainted with the character of the cane, and the nature of the soils and climates in which it grows, as well as with the best modes of packing and transporting it to distant parts, either by land or sea; and, what would add much to his qualifications, one who is also acquainted practically with the culture of the plant and the manufacture of sugar.

Among the points on this Continent, from which the cuttings could be obtained, I would instance the valley of Aragua, in Venezuela, British Guiana, or some favorable locality on the coast of Brazil. On or near the Eastern Continent, perhaps British India or the islands of Maritius and Java might prove suitable positions for the procurement of the varieties desired. The agent, thus employed, should be accurately informed or instructed with reference to the soil, climate, and elevation above the sea, of the sugar districts of these countries, as well as to the age and healthiness of the canes from which the cuttings are to be taken, the parts of the plants from which they are to be obtained, and the proper seasons of procuring them and delivering them at some accessible point in the United States near where they are intended to grow.

The varieties of cane which have hitherto been most cultivated in Louisiana are the "Striped-blue Ribbon;" the "Green Ribbon;" the "Yellow Ribbon," or "Java;" the "Red Ribbon," or "Violet;" the "Reddish-violet;" the "Red-striped;" the "Creole," "Crystaline," or "Malabar;" the "Otaheite;" the "Purple;" the "Yellow;" the "Purple-banded;" the "Grey;" the "Greyish-white."

The *Red-striped* cane, which was originally brought from the Dutch colony of Java, and the *Violet* or *Reddish-violet*, which is only a variation from the former, are believed to be the only two varieties that will generally prosper under the climate of the sugar districts of the Southern States. All the other descriptions are too sensitive to cold, except in the warmer parts of the delta of the Mississippi, Florida, and Texas. When planted in new ground, it gives a certain amount of white canes, or those the outside of which is of a greyish-white. When cultivated in old soil, however, it furnishes a good yield of violet-red cane. Again, on new ground, a part, say, from one-tenth to one-fifteenth, of the striped cane becomes white, or a dirty greyish-white. There are also to be found more or less red

stripes on some portions of the stalk, or on the joints; but all the rest of the stalk is entirely grey. On old ground, on the contrary, the red-striped gives red or violet-red canes in about the same proportion as above. The tendency of this cane to degenerate rapidly is remarkable, in every part of America. The other varieties are not so liable to deteriorate. After once degenerating, these canes never recover their original color.

The *Red* or *Violet-red* cane, which is a good sub-variety of the Red-striped, resists the cold well, and will often bear exposure from 5° to 8° F. below the freezing point.

The *Red*, and the *Red-striped* present some anomalies, in their economy which it is difficult to explain: Sometimes, and according as the season is more or less favorable, the Red-striped (the mother) yields more sugar than the Red variety; sometimes, on the other hand, the Red yields most abundantly, and that under similar conditions. In general, the Red cane is said to yield less juice than the Red-striped, the former, when mature, containing 11 per cent. of woody matter, and 89 per cent. of juice, which, in both varieties, has generally the same density under the same conditions. When the cane is yellow, there is less woody fibre.*

The "Otaheite" cane originated in the Society Islands. It is the variety most cultivated in the West Indies and South America, the introduction into which is accredited to the voyagers Messrs. Bougainville, Cook, and Blight. The former brought it to Mauritius, whence it spread to Martinique, and soon after into the rest of the West India Islands, Cayenne, and the other parts of the Continent of America. It was introduced into Louisiana about the year 1797, but is no longer regarded as suitable for general cultivation in that State, as it suffers from the slightest frost.

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* Cane-juice, on the authority of Dr. Evans, when recently expressed, is opaque, frothy, and of a yellowish-green, or sometimes greyish color. It has an aromatic and sweet taste, a balsamic odor, and produces a slightly acid reaction on litmus paper. In the latter respect, it offers considerable variations. Its specific gravity is said to vary from 1.046 to 1.110, from 7° to 15° Beaumé. These must, however, be considered as its extreme limits, which are very rarely observed. I have never seen it in any country of a density below 85°, nor higher than 13°, the temperature being 80° F. Its specific gravity usually fluctuates between 1.070 and 1.090, 10° and 13° Beaumé. The difference in density depends upon many causes, as the age of the cane, the climate, the soil, the season, the temperature of the atmosphere, &c.

Cane-juice consists of two parts, easily separated from each other by filtration, the one being a perfectly transparent fluid, of a pale-yellow color, the other a dark-green fecula, which remains upon the filter. The latter, upon examination under the microscope, is seen to be formed of a green globular matter, (chlorophille,) portions of woody fibre, cellulose in the state of the broken-up parietes of the cells, and a few shreds of coagulated fibrine. By the application of heat, and the addition of a small quantity of lime, these substances separate readily from the pure juice, and then constitute the *scum of the clarifiers*. This scum has been analysed by Avequin, who states that it consists of cerosie, or wax, 7.5, green matter, 1.3, albumen and wood 3.4, bi-phosphate of lime 0.5, silica 2.1, and water.

The transparent liquid, which remains when the above matters have been separated by filtration, consists of water, sugar, a small quantity of dextrine, varying, probably, from 1 to 4 parts in 1,000, in ripe and healthy canes, soluble compounds of proteine, saline matters, and a coloring principle, distinct from the green matter mentioned above, being soluble in water.

The constituents, as determined by analysis, from an average taken from numerous experiments made by different persons, are as follows:—

Water,	81.00
Sugar,	18.20
Organic matter, precipitated by bi-acetate of lead,	0.45
Saline matter,	0.35
	100.00

The cane called "Creole" originated in Malabar or Bengal. It is believed to have passed through Arabia, Egypt, Sicily, Spain, the Canary Islands, and the West Indies, before it reached this country, in 1751. Like the Otaheite, it is not adapted to general culture in Louisiana, in consequence of its susceptibility to cold. Both varieties, however, produce a great abundance of sugar in the hot seasons, when not injured by the autumnal frosts.

The next steps to be taken for the restoration and continued culture of sugar-cane in Louisiana are, a due regard to its management, and a judicious rotation of crops. It is of the utmost importance, in the first instance, that proper judgment be exercised in the selection of the plants from which the cuttings are to be taken. Those with healthy succulent tops should be preferred, and not the dry, hard, or woody ones, perforated by borers, which are often employed, and have occasioned much disappointment and loss in establishing plantations. Much benefit can also be derived in changing the cuttings, whatever may be the varieties, from one plantation to another, provided they are transported to analogous climates and soils.

The perfection of the culture of the sugar-cane, like that of Indian corn, consists in returning to the soil on which it grows, through the medium of fertilisers, the whole of the essential substances extracted from it by the preceding crops; the eradication of noxious weeds; and the prevention of the accumulation of stagnant water. Although there are some parts of Louisiana in which the natural condition of the soil is sufficiently fertile to allow of repeated cropping, with no other assistance than the ploughing under of the trash of the cane-fields at certain periods, yet, generally speaking, the lands of that State have become so much exhausted by injudicious cultivation that nothing but high manuring can possibly secure an abundant yield; and, as there are but few estates which keep the requisite number of domestic animals to make the amount of manure required for profitable culture, it becomes necessary that the application of extraneous or foreign fertilisers, of easy transportation, readily dissolved by the rains, and economical in their cost, must be resorted to, in order to render this branch of industry profitable. And I know of no more feasible means of accomplishing this object than by the application, in a liquid or soluble state, of Mexican, Columbian or other guanos, highly charged with phosphoric acid, which is well known to enter largely into the composition of all healthy canes. It must also be observed that an excess of Peruvian guano, or of stable or barnyard manure, applied to the cane-fields, would prove highly injurious to the crop, in consequence of the large amount of ammonia they contain, the formation of too much of which is not desirable, as it appears, on the authority of the most enlightened agricultural chemists, that nitrogen, the great basis of ammonia, however favorable it may otherwise be to the development of plants, is inimical to the formation of sugar, in their juices. This is corroborated by the experience of planters, who affirm that the sugar from canes grown in rich vallies or ravines is always dark and the cane-juice poor, taking nearly double the quantity to the hogshead that it does when the canes are of a less rank growth. Thus it will be perceived by a little reflection

that the experience of the necessity for such manuring is founded on correct chemical principles; for it will point out that ammonia, or nitrogen, should only be contained in such quantity in the manure as will nourish and develop the vegetable structure in the young plant, and by such accumulations of carbonaceous matter as will afford it the means, after such development, of forming the greatest quantity of sugar in the cells of the cane.

The lower-priced guanos and bone-dust are best adapted to supply the phosphates; but these, to some extent, are contained in the barnyard and many other manures in use. In the alluvial soils of the Mississippi valley, silica is probably even more meagerly furnished by nature, and its return is therefore more frequently called for. A partial supply of it may be obtained from the cane itself by boiling the *bagasse*, or refuse trash, in a strong potash ley, and then distributing the liquid or the residuum, which would contain a considerable quantity of the slicate of potash, upon the soil. But how far this will prove economical in the end can only be determined by the planters themselves.

From the absence, with few exceptions, of everything like an attempt at a rotation of crops, and from an injudicious perseverance, year after year, in the culture of cane, on the same fields, much of the land in Louisiana has either become wholly unfit for its production, or only capable of yielding diminished crops at a continually increasing expenditure of labor and money; and a perseverance in the same system, for some years longer, will end in the total abandonment of cane cultivation; for, as the cost of the production of sugar must progressively increase, it will be impossible for the planters to compete successfully with those of the tropics, where the cane is a perennial, the soil more enduring in its fertility, and labor is equally cheap. From this dilemma, perhaps, the introduction of a suitable variety of wheat, and the adoption of a judicious system of rotation would extricate them, and be the means of restoring to profitable cultivation thousands of acres in that State, which, if further impoverished, will finally relapse into their primitive wildness. Should wheat be found an injudicious crop to alternate directly with the cane, which belongs to the same extensive family of grasses, the interposition of the common and Chinese yams, the tanyah, or some other tuberous-rooted plants, probably could be cultivated with advantage. Should these not succeed, perhaps the bitter and sweet cassada, (*Janipha manihot et læflingii*,) and other fusiform-rooted plants, as well as the pea-nut, or pindar, the palma-christa, the bene, or other leguminous plants, adapted to the climate, and valuable for their productions, might enable the culture both of wheat and sugar-cane to be carried on in alternate fields, in endless succession with advantage to the cultivator.

From the admonition which has been received with respect to the decadence of the sugar-culture of Louisiana, superior benefits cannot fail to result. The experience of every age has well attested the folly of exclusive attention and dependence upon a single product, however profitable it may prove, and it were well for us to recognise this general law, and to resort to the only known means of exemption from its penalties. If this shall be done wisely, and in time, the

skill and industry of the planters of Louisiana will doubtless be rewarded with an increased recompense. That there are manifold advantages proceeding from diversified products, cultivated upon every farm and plantation, has often been most earnestly affirmed by those who have practically learned this truth by an exclusive system; and if the suggestions herein cited, as resulting from the experience of many in the premises, shall be well considered by the sugar-planters of the United States, it is hoped that neither the product of that crop nor the interest of the planters will suffer impairment from the evils with which they have been menaced. D. J. B.

CONDENSED CORRESPONDENCE.

Statement of the amount of sugar produced in Louisiana, in 1855, *from* P. A. CHAMPOMIER, *of New Orleans.*

	Names of Parishes.	Number of sugar-houses.	Number by steam-power.	Number by horse-power.	Number of hogsheads of sugar.
1	Rapides	37	35	2	5,579
2	Avoyelles	23	17	6	2,745
3	West Feliciana	17	17	0	2,948
4	Pointe Coupée	50	47	3	7,747
5	East Feliciana	12	12	0	951
6	West Baton Rouge	57	51	6	11,042
7	East Baton Rouge	49	46	3	5,739
8	Iberville	126	111	15	19,298
9	Ascension	56	50	6	14,475
10	St. James	77	69	8	16,142
11	St. John the Baptist	60	51	9	8,356
12	St. Charles	34	34	0	10,346
13	Jefferson	24	24	0	7,474
14	Orleans and St. Bernard	25	25	0	4,747
15	Plaquemines	46	46	0	13,829
16	Assumption—Bayou Lafourche,	142	72	70	20,156
17	Lafourche Interior do	74	53	21	15,288
18	Terrebonne do	82	56	26	15,403
19	St. Mary—Attakapas	169	69	100	30,862
20	St. Martin do	67	16	51	5,978
21	Vermilion—Lafayette	12	1	11	561
22	Lafayette	9	2	7	579
23	St. Landry—Opelousas	51	34	17	5,411
	Cistern bottoms of 192,391 hogsheads, at an estimate say, of 3 per cent	.....	.....	.....	5,771
	Total	1,299	938	361	231,427
	Estimated at 254,569,000 pounds.				

Brown sugar made by the old process,.....192,391 hogsheads.
Refined, clarified, &c., including cistern,..... 39,036 "

231,427 "

Sugar Crop in Texas, 1855.

Counties.	Number of hogsheads.
Brazoria.....	6,790
Matagorda.....	959
Wharton.....	320
Fort Bend.....	920
	Total.....8,989

Thus Texas has produced this year a much better crop than the preceding one, say 9,887,900 pounds against 7,513,000 pounds the previous season.

MOLASSES.

CONDENSED CORRESPONDENCE.

Statement from P. A. Champomier, *of New Orleans, Louisiana.*

Some of our planters have not, perhaps, made so much molasses of late years, while others have made a greater quantity than they did last season, more particularly those who rolled a good portion of their crop into syrup or molasses, which, I am satisfied, must give them a larger quantity of cistern bottoms. I therefore think that my former estimate of 60 gallons per 1,000 pounds of sugar was a fair one, or 15,274,140 gallons against 23,113,620 gallons the year previous.

CHINESE SUGAR-CANE.

For a description and account of the culture of this plant, see the Agricultural Report of the Patent Office for 1854, under the head of "Sorgho sucré," pp. xxii and 219.

CONDENSED CORRESPONDENCE.

Statement of JOSEPH C. ORTH, *of McCleary's Bluff, Illinois, condensed from his report to the Wabash county Agricultural Society.*

The first seeds which this Society received from the Patent Office, for distribution among its members, were obtained in the winter of 1855, and comprised a list of twenty-one varieties, with the cultivation of some of which most farmers were familiar, while there were others the culture and care of which nothing was known, and, in consequence, all attempts to cultivate them were necessarily experimental.

Among the latter class was the "Sorgho sucré," a gramineous plant imported into France from the north of China, some five years since. Mr. D. J. Browne, the agent of the Patent Office, in his Report upon this plant, says "he was led to infer that from the peculiarities of the climate, and its resemblance in appearance and habits to Indian corn, it would flourish in any region wherever that plant would thrive." My experience fully proves Mr. Browne's judgment correct. When the seed was obtained, nothing was known of it, and no one seemed willing to plant it on trial; bearing the name of "millet," it was supposed to be quite a different plant from that which it turned out to be. About the middle of May, I planted all the seed received, except one paper, which amounted to about a gill, on new upland, between Indian corn and broom-corn, and soon found the seed to come up in excellent order. The seed in size and shape resembled that of broom-corn, but its color was black, while the plants bore a similar resemblance, except that they came up and continued to grow more thrifty, and from the first continued to retain a deeper green color than Indian corn, tinged with a whitish fuzz over both stalk and leaf, which could be wiped off with the finger, indicating in corn generally a more luxuriant and hardy growth. At first, I concluded it was most probably a species of broom-corn, and found no cause to change that opinion, until the blossom had dried off from the seeds, and they began to harden, the resemblance to broom-corn still continuing to be so complete, even to the formation of head and seeds. But profiting by the remark printed upon the paper which contained the seeds, "Good for fodder, green or dry, and for making sugar," I cut off a few stalks and offered them to my horses and cattle, which ate them with apparently a good relish, and seemed to ask for more.

I then concluded that as a part of its recommendations was true, I should also try the other, and manufacture sugar from the juice. Its stalk being very long and heavy, and exceedingly rich in juice, and

to the taste, in its natural state, almost as sweet as molasses, no doubt remained upon my mind that it was what it was said to be. I cut six stalks, placed them successively upon a flat board, took a rolling-pin, and as well as this simple machine enabled it to be done, expressed and saved the juice. The result was, I obtained two tumblerfuls, but half was not saved. This was then boiled down, and produced one of the same tumblers half full of good pleasant-tasted molasses, about as thick as the common molasses obtained in the shops. But, as my object was simply to ascertain the quantity rather than the quality of saccharine matter contained, this juice was neither strained nor clarified, and therefore, its taste was not equal to what it would be under more careful treatment. From all that I could observe concerning this plant, I am fully convinced that 15 per cent. of good clarified sugar could be obtained from the juice. My experiment produced about 25 per cent. of molasses.

Mr. Browne says, "the great object sought in France in the cultivation of this plant is the juice contained in its stalk, which furnishes three important products, namely, sugar, which is identical with that of cane-sugar, alcohol, and a fermented drink analogous to cider." He also adds, "the juice, when obtained with care, by depriving the stalk of its outer coating or woody fibre and bark, is nearly colorless, and contains merely sugar and water, producing from 10 to 16 per cent. of the former." This, it would seem, is evidence strong enough to warrant a more extended trial of its merits, and if it will in any way supply the place of cane-sugar, it must of necessity become a very important and valuable acquisition to the agricultural products of the Middle and Northern States. I am fully satisfied that it will ripen in north latitude 42°, which is about the northern limit of Illinois.

Statement of O. H. KELLY, *of Northwood, Benton county, Minnesota.*

Last Spring, I received from the Patent Office a small parcel of Chinese sugar cane (Sorgho sucré.) It was sown with a seed-drill, came up, and grew rapidly to the height of 11 feet; but did not blossom in season for the seed to mature. If cut just as it is in blossom, it will make excellent fodder for stock.

Statement of FREDERICK MUNCH, *of Marthasville, Warren county, Missouri.*

The Chinese sugar-cane, (Sorgho sucré,) I fully succeeded in cultivating last season, by sowing it in drills 3 feet apart, in a rich sandy soil. In my opinion, the stalks contain the most saccharine matter about the time the seed is half ripe.

I have not tried to make sugar from this plant, but have succeeded in making a superior syrup. I found a difficulty in crushing the stalks sufficiently to express the juice. Could not a simply-constructed machine be invented for this purpose, so that the farmers could make sugar or syrup for their own domestic use?

Statement of SAMUEL CLAPHAM, *of Cold Spring Harbor, Suffolk county, New York.*

Early in May last, I received a small parcel of the seeds of the Chinese sugar-cane, (*Sorghum saccharatum*,) which I cultivated somewhat after the method of Indian corn. The proper time for planting, however, I should say would be the same as that of early corn, as I find it quite hardy, and stalks of it cut down the end of October made fresh shoots after two rather heavy frosts, and still were good for feed. From twenty-five plants I obtained half a bushel of ripe seed.

The mode of cultivating I would recommend, would be, to sow, after the ground is well manured and deeply ploughed, in drills 4 feet apart, the plants, 2 feet asunder in the drills, with not more than one plant in a place, as each sends up from four to six shoots. When the plants are well started, say a foot in height, turn over the earth on each side with a plough, after which, keep them clear of weeds with the hoe.

When well cultivated and in good soil, the plant attains from 10 to 14 feet in height, and produces excellent fodder from the root to the top. I believe a heavier weight of nutritious feed for all kinds of cattle can be procured from it, in a given space of ground, than from any other plant; and I think it will prove of great benefit to every section of the country where it is introduced, not only as a green feed, during the hot months, but after being cut up and cured like the corn-plant, its stalks may be steamed during the winter, and given to horses, oxen, or cows, which will commence eating at one end and never leave them till entirely consumed. The seeds, also, I have no doubt, will prove valuable as a feed for poultry, as I find they eat them with avidity.

Although in this part of the country, I look upon this plant as of great value as a forage crop, yet possibly, it may be profitably cultivated for sugar, as the juice contains nearly 10 per cent. of saccharine matter as clear as crystal, and on a very small scale, beautiful clarified sugar was produced by my friend Dr. Ray. This matter, however, will be carefully tested here the coming season, as several of us are preparing to go into it rather extensively.

I have distributed seeds to nearly two hundred persons, from Massachusetts to Tennessee.

Statement of D. MINIS, *of Beaver Plain, Beaver county, Pennsylvania.*

Last spring, I received from the Patent Office, a small parcel of the seeds of the Chinese sugar-cane, described in the Agricultural Report of 1854, under the name of "Sorgho sucré." I planted it about the 20th of May, although it might have been sown 10 or 15 days earlier; but, fearing that it might be injured by a late frost, I preferred to plant it thus late. I planted it in the centre of a twenty-acre field in two rows, with the hills about 3½ feet apart, with from two to six seeds in each hill. Where the plants were three or four to a hill, they grew the most vigorously, and seemed to produce the

most perfect seed. I gave them no extra culture either in labor or manure; the plants had no protection from sunshine nor storm, before I secured the seed, which I did by cutting off the tops of the plants 2 or 3 feet below the seed spikelets, bound them into bundles or sheaves, and placed them in an open shed, there to remain until the time of planting next spring. They are yet quite fragrant, and taste strong of the saccharine juice.

The account given of this plant, at page 219 of the Agricultural Report of 1854, accords precisely with all my experience in its culture. The given weight of the crop on a given space, growing, as it did with me the past season, I think would be nearly or quite equal to that of Indian corn.

Statement of J. H. HAMMOND, *of Silverton, Barnwell district, South Carolina, as reported to the Beach Island Farmers' Club.*

A rule of this Club, requiring every member to make and report, each year, an agricultural experiment, I will take this opportunity to acquit myself of that duty. One of our members, Mr. Redmond, of the "Southern Cultivator," distributed among us, last winter, some seeds of what is commonly called "Sugar Millet." He very kindly gave me enough to plant half an acre—about a pint. I prepared a plat of ground on a northern slope, of old, stiff and worn-out land, in such a manner and with as much manure as would probably have made it yield, with average seasons, about 20 bushels of corn per acre. On the 22d of March, I planted the seed in three-foot drills, dropping every 18 or 20 inches some six or eight seeds. It was ploughed and hoed often enough to keep the grass down, and about the 1st of July began to head. The heat had then been unusually intense for two weeks, and has continued so up to the present time; and latterly, the drought has been very destructive. I do not think this half acre would have yielded 5 bushels had it been planted in corn. Having intended, however, to ascertain whether the millet would make syrup, I had a rude mill put up with two beech-wood rollers.

Finding that by the 22d of July the most advanced heads had passed the milky stage, I had 1,750 canes cut, which I supposed were a fair sample of the patch. The first 300 or 400 were passed through the mill twice, the remainder four times, and the yield was 194 quarts of juice. But 10 canes, which I selected and passed seven times through the mill, yielded 3 quarts. The juice was received in common tubs and tested by a thermometer, and a saccharometer with a scale of 40°. The thermometer stood in every instance at 78° F. The saccharometer varied from 21½° to 23½°. At the latter point, the juice would float a fresh-laid egg. I boiled it in a deep, old-fashioned "cow-pot," and, after six to seven hours' boiling, obtained 32 quarts of tolerable syrup.

The next day, I selected 10 canes, the heads of which were fully matured, 10 more in full milk, 10 more the heads of which were just fully developed and the top seed beginning to turn black, and again

10 comprising all these stages, but from which I did not strip the leaves. They were all passed through the mill seven times, and yielded nearly the same quantity of juice—about 3 quarts for every 10 canes. The juice, tested by the saccharometer, showed that the youngest cane had rather the most, and the oldest rather the least saccharine matter. The whole, together with that of a few other good canes, exhibited at 80° of the thermometer 24½° of the saccharometer. From 42 pints of the juice, I obtained, after four hours' boiling, 9 pints of rather better syrup than that made the day before. In these boilings, I mixed with the cold juice about a teaspoonful of lime-water of the consistency of cream for every 5 gallons.

These selected canes grew on the best spots of the patch, and where probably corn might have been produced, the present season, at the rate of 20 bushels to the acre. They were an inch in diameter, at the largest end, and 7½ feet long after cutting off the head and a foot of the stem. After this, I cut down all the inferior cane and cured it for forage.

On the 28th of July, two of the members of the Club (Dr. Bradford and Mr. H. Lamar) being at my house, remained to see the result of pressing and boiling 400 canes I had cut and stripped. Each of us selected 10 canes, and put them through the press eight times; the result being as before, about 3 quarts for every 10 canes. But even after the pressure, juice could be wrung from the canes by the hands, and we agreed that at least one-fourth of it, and that the best, remained in the cane—so inefficient was my mill. The rest of the cane, I ordered to be pressed six times, but we did not ourselves remain to see it done, nor did we count the 400 canes. The yield of the whole, however, was 37½ quarts. With the thermometer at 85° in the juice, the saccharometer stood at 24½°; we boiled the juice until it run together on the rim of the ladle and hung in a transparent sheet half an inch below it before falling. And this in two and a half hours. The result was 6 quarts of choice syrup. The next day, I repeated the experiment on a larger scale, with equal success, and I have brought to the Club enough of the syrup to enable every member to try it and judge of its quality. All who have tasted it, agree that it is equal to the best that we get from New Orleans. In these last boilings, I put a table-spoonful of lime-water, prepared as before, to every 10 gallons. The whole process of clarifying and boiling was carried through in the same pot, and that very unsuitable from its depth.

I measured the grain from a number of heads, and the result was an average of a gill from each. I weighed a half peck of matured seed, after several days' exposure to the sun. It weighed 4¾ pounds, equal to 38 pounds to the bushel. I weighed 20 of the best canes cut for forage, after it was cured sufficiently to house. They weighed 24 pounds, equal to 30,000 pounds for 25,000 canes, [per acre?] which I think might be grown on land that would make 25 bushels of corn with average seasons. I have tried horses, cattle, and hogs, and find they eat the cane, its leaves and seed, greedily, and fowls and pigeons the last. I think, however, when allowed to mature, the cane should be cut up fine for animals, as the outer coat is hard.

I did not attempt to make sugar, not having prepared for that. There can, however, be no doubt that it can be made from such syrup as this. And, as they make more syrup in the West Indies per acre than they do in Louisiana, only because the cane matures better, it is not unreasonable to infer that the millet, which matures here perfectly, and will even make two crops in a year, will yield more and better sugar than the Louisiana cane.

Beginning to cut the cane as soon as the head is fully developed, it may be secured for a month before it will all ripen—how long after that I do not know. A succession of crops might be easily arranged so as to insure cutting and boiling from the 1st of July—probably earlier—until frost. I have housed some stalks directly from the field, to ascertain hereafter, whether, thus treated, it will yield juice and make syrup next winter.

A good sugar-mill, with three wooden rollers, may be erected for less than $25, and a sugar-boiler that will make 30 gallons of syrup a day, may be purchased in Augusta for less than $60.

This millet will, of course, mix with any other variety of the family, if planted near it. Unfortunately, I planted broom-corn about 100 yards from mine, and shall therefore have to procure seed elsewhere for the 10 acres I intend to plant next year.

I have now stated the chief particulars of my experiment. Every member of this Club is competent to draw his own conclusions. A single experiment—especially one in agriculture—is rarely conclusive. I may err myself, and might cause others to err, were I to express, with any emphasis, the opinion I at present entertain of the value of this recently introduced plant.

Statement of COMMODORE AP CATESBY JONES, *of Prospect Hill, Fairfax county, Virginia.*

Among the field and garden seeds, I received from the Patent Office last season, (1855,) was a package marked "Sugar Millet," which from its strong resemblance to a species of millet known as "Chocolate Corn," in Lower Virginia, received but little attention from me; nevertheless, after everything else of the sort was planted, the sugar millet seed were strewn in a furrow by the side of a lane, and not much cared for afterwards, until the frost took it, when a few heads only, not more than three in a hundred, had matured.

The perfect heads being collected, all the stalks were cut down to the ground, and a few armfuls thrown over into the lane, where cattle and swine had free access. It was amazing to see with what avidity both devoured every part and particle, blade and stalk, making a clean sweep of the whole. The frosted millet was fed to the same animals several days in succession, and without the least abatement of their appetite for it. I had not a sufficient quantity to test its fattening value, but from the avidity with which the animals devoured it, and the large amount of saccharine matter it is now known to contain, it must be greatly superior to Indian corn as fodder, and it is quite as easily cultivated.

The proper time for planting, I think, is when the earliest planted Indian corn first appears above ground, the soil and mode of cultivation being similar as for broom-corn.

THE COMMON CAPER.

The common caper (*Capparis spinosa*) is a deciduous-leaved shrub indigenous to Southern and Eastern Europe, usually found amongst rubbish and upon old walls. In the Grecian islands, it occurs by the sea-side on rocks.

This plant is cultivated on a large scale between Marseilles and Toulon, in many parts of Italy, as well as on Malta, Sicily, and the islands of the Levant. It is propagated from cuttings, or suckers, which are planted about 10 feet apart, in a lean soil, without manure. It may also be raised, by sowing the seeds upon old walls, where they will take root between the bricks, and endure for many years. The plants require to be sheltered from severe winds, and to be favorably exposed to the sun, and scarcely ever suffer from drought or heat. In spring, they need only one dressing; in autumn, they are cut down to within 6 inches of the ground, and covered with the surrounding earth, which is raised about them on all sides. The succeeding spring, they are laid bare to the crown of the stump, soon after which they throw out fresh shoots. In the early part of the summer, they begin to flower, and thus continue in succession, until they are destroyed by frost or cold. In the vicinity of Toulon, this plant is cultivated in orchards, in the intervals, between the fig and olive trees; and in the neighborhood of Paris, it is trained on low walls, and the shoots during the winter are laid down and covered with earth, to protect them from the frost.

In the islands of the Mediterranean, and near Toulon, the flower-buds of the caper are gathered while very young; for, as they enlarge, they decrease in value; the collecting of these buds forms a daily occupation for six months in the year, while the plants are in a flowering state. As the buds are gathered, they are thrown into a cask among as much salt and vinegar as is sufficient to cover them, and as the quantity of capers is increased, more vinegar is added. When the caper season closes, the buds are then sorted according to their color and size. The smallest and greenest being best, they are separated from the larger ones, and put into small casks of fresh vinegar, when they are ready for shipment or use. In this state, they will keep well for many years. In Italy, the fruit is prepared in the same way as the flower-buds; both are bitterish, acrid, and aromatic. It is said to be a common, though pernicious practice, to put filings of copper in the first pickle, to give the buds a green color.

The chief supply of the capers used in this country as an ingredient in sauces to be eaten with boiled fish and meats, especially mutton, are from Sicily and the south of France. D. J. B.

CONDENSED CORRESPONDENCE.

Statement of ROBERT CHISOLM, *of Beaufort, Beaufort district, South Carolina.*

Two years ago, I imported from Paris a few caper plants, (*Capparis spinosa,*) at a cost of 75 cents each, when delivered here, two of which I planted in my garden, and they have succeeded very satisfactorily. The summer of 1854, I allowed all the buds to blossom, with the hope of getting some seed, but only one pod seemed to ripen, and the seeds of that, when sown, never came up. The past summer, I concluded to pickle the buds. This was done merely by dropping them into a jar of vinegar as soon as they were grown. Some of the first gathered were rather large, but those of a later growth were of a proper size. When pickled, they resemble, both in taste and appearance, imported capers. This plant could be cultivated very readily in a garden, to an extent more than sufficient to supply the wants of a family.

The caper here, dies, down to the root, every winter, and sprouts up again in the spring. No care nor protection was bestowed upon it during the winter, although planted in a clayey soil, which experience would warrant me in saying is preferable to one that is sandy. The blossom, also, is sufficiently conspicuous to render this plant an object of culture for ornament; but, in this case, the pickles must be given up, as the small flower-buds are the parts used for that purpose.

THE CASSADA PLANT.

CONDENSED CORRESPONDENCE.

Statement of JOHN B. GAZZO, *of La Fourche parish, Louisiana.*

The cassada plant, (*Janipha manihot,*) on account of its nutritious qualities, and ready convertibility into bread, is a most valuable product. It was extensively cultivated by the first inhabitants of Louisiana, where it grows so abundantly that a quantity of ground planted with it will feed more than six times as many persons as if sown with any of the Cereals. It sends forth numerous crooked branches, to a height of 4 or 5 feet, full of knots, which are easily broken.

The cassada is propagated by planting the joints, or slips, after the manner of sugar-cane. The roots attain maturity in about nine months, although they possess the extraordinary advantage of remaining uncorrupted in the ground for many years.

THE BENE PLANT.

CONDENSED CORRESPONDENCE.

Statement of H. M. BRY, *of Monroe, Ouachita parish, Louisiana.*

Last spring, I planted my bene seeds (*Sesamum orientale*) about a month later than I should have done, on the 1st of May, instead of the 1st of April. The consequence was, I did not get more than half a crop, as the pods did not mature before the 24th of October, when there was an unusually early "freeze," the temperature being as low as 30° F.

This plant, to succeed well, should have the whole of the warm season, in order to mature in such a year, as the present; and, as a general rule, it will always prove a certain crop, if planted early. Still, it will sometimes mature its pods, if planted as late as the end of May.

FRIJOLES, OR TURTLE-SOUP BEANS.

CONDENSED CORRESPONDENCE.

Statement of JOHN SPINKS, *of Blackwater, Kemper county, Mississippi.*

I have tried the "Turtle-soup Bean" you sent me, and find it very productive, bearing early in the summer, and continuing to bear until frost comes. The season was unfavorable for a fair trial, as we had no rain from the 1st of July to the 1st of September. It bore a little all the time; but, when the rain began, it yielded until November 5th. I have saved seed enough to supply this county.

ONIONS.

CONDENSED CORRESPONDENCE.

Statement of JULIUS MEEKER, *of Westport, Fairfield county, Connecticut.*

There are devoted to the culture of onions, in this town, more than 60 acres of land, yielding on an average 500 bushels to the acre, and

they are a most profitable crop. We can raise them on the same ground for years in succession.

Our mode of preparing the ground is, as early as practicable in the spring, to cart on about 20 tons of manure to the acre, having previously had it thrown into a heap, that it may be well heated, and thus kill all noxious weeds. After spreading, we plough it in, turning it under so deep that the harrow will not draw it to the surface. If it will not turn under readily, a man, following the plough, pushes it into the furrow. We next cover it thoroughly with a wooden-toothed harrow, then use the brush, leaving the ground in good order for raking, which is done with a common wooden hay-rake. We then sow from 3½ to 4 pounds of seed to the acre. When the onions are up, we commence hoeing, and the weeding follows, which is continued at regular intervals, as long as required. In September, the tops become dry and fall, when onions should be pulled and spread on the ground, separating the green ones from the dry. The latter should be raked into heaps, after a few days; for, if allowed to remain too long exposed to the sun, they will assume a dull-red color, and be liable to injury. When well cured, remove them to a building for the winter, where they should be spread upon a platform, about a foot from the floor, giving them air, when the weather will permit. In topping them, cut about an inch from their bulbs. Hog-manure and wood-ashes are the best fertilisers for this crop.

Onions sell here for 50 cents a bushel.

ENGLISH RED CABBAGE.

CONDENSED CORRESPONDENCE.

Statement of WILLIAM D. BRACKENRIDGE, *of Govanstown, Baltimore, county, Maryland.*

The few seeds and roots, received from you last year, turned out well, particularly the English "Red Cabbage." The heads raised from it were admitted to be the finest ever brought to the Baltimore market.

CHILI BIRD-PEPPER.

CONDENSED CORRESPONDENCE.

Statement of JOHN H. ROGERS, *San Antonio, Bexar county, Texas.*

The "Chili," or "Bird-pepper" grows in great abundance in South-western Texas, and will doubtless, in time, form a considerable

article of commerce. When cultivated, it improves in size and quality, and is very pungent. As it is a perennial, when once planted with care, it will spread and increase for many years; and is an ornament to any garden. It commences ripening in July, and continues until its foliage is destroyed by frost.

MARKET GARDENING.

CONDENSED CORRESPONDENCE.

Statement of GEORGE P. NORRIS, *of Newcastle, Newcastle county, Delaware.*

Until of late, very little attention has been paid, in this county, to the cultivation of vegetables; indeed, many persons, at the present time, are dependent for them on the "Neck," near Philadelphia. About eighteen months ago, I commenced market gardening, by procuring the services of an experienced "trucker," of Philadelphia county, and find that my garden has produced me a very handsome return. I gave the two acres intended for the purpose, which were very high and stony, a dressing of manure, at the rate of 30 two-horse cart loads to the acre, ploughing it in deep, and planted it with potatoes. I then picked off the small stones, and blasted out the large ones. As soon as the potatoes were dug, in the fall, I applied to the ground another coat of manure, turned it under, and left it until the spring of 1854, when I ploughed in another coat of manure, and sowed the vegetables, which produced a good crop.

Last winter, instead of applying stable manure, as formerly, I commenced using night-soil, and am perfectly satisfied that my success has resulted in a great measure from its use. For the production of early vegetables, which should be the aim of the market gardener, it cannot be too highly recommended. I apply it in the crude state, in December, when the ground is sufficiently frozen to bear up the cart, spread it on the surface, and let it remain until spring. As soon as the weather is open enough to commence the operations of gardening, I work the ground with the plough and harrow, plant out my cabbages, and sow my radishes and beets. By this method, I produce fine vegetables ten days in advance of those who do not employ this kind of manure. I should have stated, that the cost of night-soil, delivered at the garden, which is about a mile from the main street of Wilmington, is 20 cents a hogshead, or load.

The most profitable crop to the marketman is cabbages, the seeds of which are sown in a southern border, about the 15th of September. In a month or six weeks after, the young plants are transferred to a frame, and covered with boards, which are removed on fine days

through the winter, but always replaced at evening. The plants are taken out as early in the spring as the ground will permit, and set in rows. Many of the plants are destroyed by an insect which much resembles the corn-worm. It eats the stalk just at the surface ofthe ground, but is generally discovered about an inch below, near the plant.

Next, in point of profit, to cabbages, are beets. They are sown very early in the spring, on ground prepared as described above. We sow at the first indications of mild weather, but are sometimes deceived, and the seeds are lost. We find it far more profitable, however, to run this risk, than to wait until the weather is established.

FRUITS, NUTS, AND WINE

APPLES.

CONDENSED CORRESPONDENCE.

Statement of MASTON S. GREGG, *of Fayetteville, Washington county, Arkansas.*

Increased attention is now paid to the culture of fruit in this section of the country. I have an orchard of 300 grafted apple-trees, which bear every year. Apples have not failed in this district for eighteen years past. From the elevation of our county, (Ozark mountain ridge,) they keep well until June.

The "Russet," "Limbertwig," "Newtown Pippin," and "Kentucky Milam," are our best keepers. The "Tennessee Milam," and "Kentucky Red," are our best early winter apples. The "Rambo" is the best fall variety.

The price of apples here is 50 cents a bushel.

Statement of JAMES W. FAULKNER, *of Stamford, Fairfield county, Connecticut.*

This section of the country is well adapted to the raising of fine apples. The farmers are introducing all the new varieties, and one of them exhibited at our last county fair thirty-six sorts.

Not much attention is given to summer apples, the "Red Astrachan" being one of the best. For fall and winter varieties, the "Fall Pippin," "Seek-no-further," "Canfield," "Russet," "Lady," and the "Siberian crab," are the most profitable.

Within a few years, the trees have been attacked by the borer, and

no effectual remedy has been discovered, except cutting out and destroying the grub.

Apples readily sell here from $1 50 to $2 a barrel, and cider from $4 to $5 a barrel.

Statement of ADOLPHUS ENGELMANN, *near Belleville, St. Clair county, Illinois.*

Apples are extensively cultivated in this vicinity. They are a sure crop, and pay well. Most orchards, however, would pay better, if they contained fewer summer and more winter apples, as the latter may be safely shipped to distant markets; they make far better cider and dried fruit, and are more valuable for family use. The great quantity of summer apples overstocks the market, so that they will not pay for transportation. They rarely make good cider, and will not even make good vinegar; and they drop from the trees at a time when they will scarcely pay for picking, as food for hogs.

The only kind of summer apple I have grown, for several years past, to advantage, is called the "Queen Pippin," which, from its early maturity, great size, and generally fine appearance, always commands a fair price, and is bought by fruit merchants for shipping to the North. The "Belle-fleur" also pays well, while the "Red" and "Yellow June Harvest," and other kinds of summer apples, are drugs in the market.

Persons engaged in drying fruit should provide themselves with dry-houses, as that prepared in them is better, and less liable to the attacks of insects, than that which has been dried in the sun. With such a house, fruit may be dried during any kind of weather, without trouble or injury to it. Last season, large quantities of fruit, already peeled and prepared to be dried in the sun, were destroyed by the continued rains.

The winter apples I prize most are the "Jenetting," "Newtown" and "Winter" Pippins, and "Flushing Spitzenberg."

Statement of C. W. BABBITT, *of Metamora, Woodford county, Illinois.*

Sufficient time has not elapsed since the settlement of this part of the country, to determine what varieties of apples can be cultivated with the best success. There are some native seedlings with us, which are productive and promise fair.

Of summer apples I will notice the

Early Harvest,	Sugar-loaf Pippin,
Sine-qua-non,	Red Astrachan,
Sweet Bough,	Golden Sweet,
Caroline,	American Summer Pearmain,
Red June,	

Of autumn apples, there are the

Rambo,	Red Ingestrie.
Holland Pippin,	

Of winter apples, the

Limbertwig,	Wine Sap,
Milam,	Yellow Belle-fleur,
Rawles' Jennetting,	Ortley, or White Belle-fleur,
Roman Stem,	Baldwin.
Small Romanite,	

My mode of planting apple-trees is, to set them in the ground no deeper than they stood in the nursery, as the roots need all the warmth of the sun which nature provides. I cultivate the ground in the orchard with potatoes, corn, or beans, for four or five years, not allowing the earth to accumulate over the roots any deeper than at first.

I remove no thrifty limbs from the trees for the first five years, except those which grow within 2 feet from the ground; for healthy limbs promote the quickness of growth. I thin out the tops thoroughly every winter, after the fourth year, leaving the branches low, and supply the trees liberally with manure as soon as they begin to bear.

Statement of B. F. WILBUR, *of Monson, Piscataquis county, Maine.*

Little attention is paid to the culture of fruit in this region. Apples are grown to a limited extent in the older portions of the county, but they are generally inferior in quality. In many cases, where farmers have undertaken to plant orchards, they have experienced much trouble in securing the trees against winter-killing. This might probably be avoided, in a great measure, if the system of mulching, and providing other protection from extreme heat and cold, were better understood.

Our soil is well adapted to the growth of the apple-tree, and also of the pear; and, if our cultivators would engage in the business with perseverance, and a proper understanding of the subject, there is no doubt they would, sooner or later, be successful. Fruits of various kinds, no doubt, might be abundantly raised in this county, and of the best qualities for preservation.

Statement of C. F. MALLORY, *of Romeo, Macomb county, Michigan.*

Apples are the principal fruit cultivated with us, as they will best bear transportation. The choice varieties for fall use are, the "Rambo," "Fall Pippin," and "Gravenstein;" for winter, "Baldwin," "Hubbardston Nonsuch," "Northern Spy," "Newtown Pippin," "Rhode Island Greening," "Roxbury Russet," "Swaar," and "Esopus Spitzenberg."

Good winter apples usually sell here from $1 to $1 50 a barrel. Cost of transportation to New York, $1 a barrel.

Statement of GEORGE WHEATON, *of Detroit, Wayne county, Michigan.*

Apples are the principal fruit cultivated in this county; not that many other kinds of fruit will not succeed well, but because apples usually bear a crop without any other cultivation than setting out the trees, and leaving them to take their chance. They are probably of more importance than any other fruit in this State, and it is generally conceded that an orchard of apple-trees will pay more per acre than any other crop. They are rarely injured by cold, and the fruit is seldom affected by spring frosts.

Apples of all the leading varieties do well here. It was admitted by good judges, at our last State Fair, that ours were larger and finer than the same varieties grown in Western New York. The chief disadvantage in culture is the apple-worm, which lays its egg in the blossom-end of the young fruit, causing it to fall before it is ripe. In some orchards, in this vicinity, much damage is done by this insect, and occasionally nearly half of the crop is destroyed. The only remedy for this evil that I know of, however imperfect, is to gather up the fruit thus affected, as fast as it falls, and feed it to the hogs.

The larger kinds of apples usually sell, in the fall, for 50 cents a bushel, and the ordinary ones for 25 cents.

Statement of JOHN HEBRON, *of La Grange, Warren county, Mississippi.*

The best apples for this region are the "Early Harvest," "Virginia May," "Virginia Red," "June Red," "Astrachan," "Early Red," and "Margaret," all ripening in June, and free from the diseases incident to most apples.

The summer varieties are the "Holland Pippin," "Gravenstein," "Hebron's Surprise," "Gloria Mundi," "Webster Pippin," "Spice Pippin," "Yellow Belle-fleur," "Horse Apple," "Wine Apple," "Summer Pearmain," and "Leatherberry's Favorite," all hardy kinds, and well adapted to any latitude south of Nashville.

The hardiest winter kinds are the "Spark's Late," "Terrie Late," "Wine Sap," "Mississippi Winter Sweet," "Esopus Spitzenberg," and "Marshall county." Some of the varieties are purely of Southern origin.

Statement of SAMUEL J. FLETCHER, *near Winchester, Clarke county, Missouri.*

Apples are our principal fruit, and grow well. They bring, in market, from 50 cents to $1 a bushel.

Statement of D. R. STILLMAN, *of Alfred Centre, Alleghany county, New York.*

Apples are the principal fruit cultivated here, and can be profitably raised, either for market or for feeding stock.

The varieties most esteemed are the following:—

Early Harvest,	Newtown Pippin,
Sweet Bough,	Esopus Spitzenberg,
Fall Pippin,	Baldwin,
Golden Pippin,	Northern Spy,
Golden Sweet,	Swaar,
Porter,	Rhode Island Greening,
Hawley,	Roxbury Russet.

Good apples usually sell here from 25 cents to 50 cents a bushel, and can be transported to New York for 79 cents per 100 pounds.

Statement of JOSEPH HAINES, JOTHAM S. HOLMES, JOHN A. HOWE, OLIVER GREEN, JR., *and* A. F. DICKINSON, *being that portion of their report on apples, to the Katouah Farmers' Club, West Chester county, New York.*

The apple is the principal fruit raised in our vicinity for market. The "Summer Bough," for summer use, "Fall Pippin," for autumn, and the "Rhode Island Greening" and "Russet," for winter, are most largely produced, though many other kinds are cultivated.

The prices of apples, the present season, are $1 50 per barrel for "Summer Boughs," $1 75 for "Fall Pippins," and $1 25 for "Rhode Island Greenings." Cost of transportation to New York, 17 cents a barrel.

Statement of AMOS HARRY, *of Farm Valley, Polk county, Oregon Territory.*

I have determined to send you a few observations on the apples of the Willamette valley. When I arrived here in the fall of 1845, there was an orchard at Fort Vancouver, and a few small ones among the French settlers in this valley; but they were composed entirely of seedling fruit. They were said to be from Canada. The trees bore early, and were very full, but the apples were small, and much inferior in appearance and flavor to those raised in Western Pennsylvania and Virginia, forty-five or fifty years ago. From the diminutive size of the crab-apple, which is not larger than a common black haw, the opinion generally prevailed that the Willamette valley, although so admirably adapted to the raising of small grain and grass, would never be a good fruit-growing country.

It was not until the fall of 1847, so far as I have been able to learn, that any of the cultivated fruits of the United States were introduced into this county. Then Messrs. Llewellen and Meek came to the valley from Iowa, bringing with them, planted in a wagon, in a bed, prepared for the purpose, fifty varieties of the choicest apples cultivated in the Western States, a good variety of cherries, pears, plums, and peaches, and quite a stock of apple, pear, and plum seeds. They set the trees, and planted the seeds, on the east bank of the Willamette river, near Milwaukie. They purchased, that winter, some seedling nurseries, and, by budding, for the first two years,

making every bud count, they were able, in 1849–50, not only to set out a large orchard themselves, but to sell many thousand trees to settlers in various parts of the valley. Most of the trees that have been well cared for have borne fruit for three seasons, which, in size, beauty, and flavor, will compare favorably with the finest specimens of the same varieties grown in the Eastern States, thus demonstrating the admirable adaptation of our county to the growth of choice fruit.

Statement of D. MINIS, *of Beaver Plain, Beaver county, Pennsylvania.*

Within a few years, considerable exertion has been made, in this part of the State, to procure the best varieties of apples, as well as of other kinds of fruits, suited for the various purposes and seasons. The apple and peach are the most esteemed, on account of their hardiness and certainty of production.

Of apples, we have the "June," the "Early York," the "Maiden's Blush," the "Queen," and the "Harvest Sweeting" for summer use; the "Gate," the Golden Pippin," the "Cooper," the "Roman Beauty," and the "Pawpaw Sweeting," for fall and early winter; the "Striped Seek-no-further," the "Newtown Pippin," the "Green Rambo," the "Rhode Island Greening," the "Belle-fleur," the "English Rambo," and the "Rock Remains," for winter and spring

The price of apples, the past season, has been from 15 to 40 cents a bushel.

Statement of J. A. CARPENTER, *of Waukesha, Waukesha county, Wisconsin.*

For several years past, the scale insect has been on the increase in this vicinity, in our orchards, and some of the trees are completely covered with it. The best known remedy is a mixture of equal parts of tar and linseed oil, applied moderately warm, with a brush, to the trunk and larger limbs.

If apple-trees are planted on a suitable soil, and taken proper care of, they will not become infested with these insects.

Statement of ROBERT W. BAYLOR, *of Wood End, near Charlestown, Jefferson county, Virginia.*

Apples are the principal fruit produced in this county. They grow to great perfection, with little or no cultivation. The trees generally bear full on alternate years.

Our summer varieties are the "Yellow June," "Vestal," "Grub," "Golden Sweet," "Doctor Red," and "Summer Pearmain."

The autumn varieties are the "Gravenstein," "Rambo," "Blenheim Orange," "Belle-fleur," "Fall Pippin," "Cat Head," and "Pound."

The winter varieties are the "Newtown Pippin," "Green Pippin,"

"Lady Finger," "Sheep Nose," "Russet," "Black Coal," "Prior's Red," "Limbertwig," "Phœnix," "Abram," "Jennetting," "Vandervere," and "Smoke House."

PEARS.

CONDENSED CORRESPONDENCE.

Statement of C. W. BABBITT, *of Metamora, Woodford county, Illinois.*

The pear has not generally succeeded very well in this section, being somewhat subject to blight. There are trees, however, some 20 miles south of this, that have been planted more than twenty years, and have borne well. I have a small orchard of fifty trees, most of which have been planted five years. Several of them, growing where the ground was highly manured with stable compost, have been badly blighted, while those only grown in the turf, and plentifully dressed every year with coal ashes, are all thrifty. Some twelve of them have flowered for two years, but have borne but little fruit.

The varieties referred to are the

Marie Louise,	Bergamot,
Pound,	Vicar of Wakefield,
Virgouleuse,	Bell,
Surprise,	Early Summer,
Gratiolet,	Butter,
Golden Drop,	Seckel,
Bartlett,	Prettiman.

Statement of GEORGE WHEATON, *of Detroit, Wayne county, Michigan.*

Pears usually succeed well in this county, especially in the vicinity of Detroit. We have many fine old specimens, planted by the early French settlers, from 1¼ to 2 feet in diameter, which generally yield a heavy crop, and sell in the market for about $2 a bushel. Pears, on quince stocks commonly do well. I have trees which have been transplanted four years, that were two years old when removed, and which, last season, produced half a bushel to each tree.

The last winter was very severe upon pears in this vicinity; yet, my trees were not injured, though the fruit-buds were half destroyed by the cold, the glass showing the temperature at 22° F. below zero, and remaining so for two weeks.

Statement of JOHN HEBRON, *of La Grange, Warren county, Mississippi.*

The "Madeline," "Jargonelle," and "Skinless" pears are the best early varieties. The Madeline ripens early in June, and, though small, is a delicious fruit. The Jargonelle ripens from the middle to the last of June, and is a fine pear, except that it is liable to rot at the core, when it ripens on the tree. The Skinless is a superior early variety, ripening late in June. It is worth $6 a bushel, at Vicksburg.

The "Bartlett," and "Beurré Diel" are the best summer and autumn varieties, and will ripen in the house. They can be gathered as soon as they attain a full size, or even sooner, and ripen so as to retain a delicious flavor. They bring from $6 to $8 a bushel, and can be safely shipped to any market within 2,000 miles, by steam transportation. I have 100 acres of these two varieties, and have shipped enough, this season, to bring $5,000.

The "Eastern Beurré," "Winter Nelis," and "Mammoth" pears are my best winter varieties, which keep until late in the winter.

PEACHES.

CONDENSED CORRESPONDENCE.

Statement of ADOLPHUS ENGELMANN, *near Belleville, St. Clair county, Illinois.*

Many persons, in this section, are turning their attention to the cultivation of peaches, but they are apparently not aware of the disadvantage of planting seedling trees, without knowing what kind of fruit they will bear. Though it may be desirable that some persons should be at the trouble of doing this, in order to obtain new varieties, yet they will find it to be more profitable to procure budded trees, of choice varieties, as they require no more space nor culture than the most indifferent seedlings.

Peach-trees may be budded throughout the summer. I have succeeded in doing so, from the latter part of June to the 1st of November, though the most favorable months are August and September.

I would suggest, to any one having peach-trees bearing indifferent fruit, to proceed in February, or early in March, to cut off the branches, a foot or two from the main trunk. By August, one may bud the young sprouts, and after three years, he will obtain the fruit he has chosen.

Some writers on the culture of fruit have recommended removing the soil, before winter, from the roots of peach-trees, near their trunks, to destroy by cold the worms infesting that part of the tree. One of my neighbors followed this advice, and most, if not all his trees, were killed, while the worms survived.

The most valuable peaches raised in this vicinity are the several kinds of "Rareripes," "Early Yorks," "July" and "Heath" clings. The "Freestones" are preferred for the home market.

Statement of C. W. BABBITT, *of Metamora, Woodford county, Illinois.*

We are provided with good peaches for more than two months in the season; the earliest is the "Morris' Red Rareripe," which matures the middle of August; the next is the "Yellow Rareripe," which matures the end of that month; and the "Golden Drop" and "Oldmixon Clingstone," which are ripe in September.

The peach-trees, in this section, have not been materially damaged by the winter since 1846; neither have they been injured by the "yellows." The borer appears to be their only enemy.

Peaches sell here from 20 cents to $1 a bushel.

Statement of JOHN HEBRON, *of La Grange, Warren county, Mississippi.*

My best peaches are the "Early York," "Early Tillotson," "George the Fourth," and "Smooth-leaved Royal George," ripening from the 1st of June until the middle of July. "Lemon Cling," "Monstrous Free," "Druid Hill," "La Grange," and "Cox's October" are my choice kinds. I have many others, very fine, but these are the best.

Statement of AMOS HARRY, *of Farm Valley, Polk county, Oregon.*

The peach, in this county, has been affected with a disease, known as the "curled leaf," which threatens to destroy the trees. It made its appearance on Mill creek, in Marion county, in 1852, and extended considerably on that side of the river in 1853, but had reached most parts of the valley in 1854–5. Some trees seem to escape it much more than others; but, if the malady increase for two years to come, as it has for two past, I fear we shall come entirely short of this delicious fruit. Some think it is owing to cold, wet weather, and recommend shortening all the limbs as a remedy; and some experiments seem to favor this idea. Others think it is produced by an insect, and that no remedy will save the trees, unless it can be applied to the whole surface of the leaves.

Statement of D. MINIS, *of Beaver Plain, Beaver county, Pennsylvania.*

Of peaches, we have a great variety in this section, procured from every source; but our native seedlings, when carefully selected, are surest to produce a crop, and, for culinary purposes, are equal to any.

The price of peaches, the past season, has been from 10 to 15 cents a bushel.

Statement of JAMES HOUGHTON, *of East Cleveland, Cuyahoga county, Ohio.*

Since the fall of 1845, my attention has been directed to the cultivation of orchard trees and orcharding, and more especially to the peach-tree. The year 1856 will long be remembered by all cultivators in this county and State, for its barrenness of a peach-crop, as well as for the extensive destruction of trees, both young and old, in consequence of the unusual severity of the preceding winter. For instance, on the 9th of January, the thermometer was, at 6 A. M., 19° below zero, and did not rise 10° above that point for more than thirty hours; and, after this, it was repeatedly from 10 to 14° below zero.

In regard to the destruction of trees, there has been great variableness in this and the two adjoining townships, to the east and west of it. In some small orchards, say from 200 to 1,000 trees, the loss has varied from 25 to 50 per cent., killed root and branch, while the ravages of the peach-worm have proved more extensive than usual. In orchards within a mile of my own, the loss has been trifling, and in mine, which comprises 3,200 trees, I have lost but 69; and, the end shoots of last year's growth being entirely killed, the centre of the head of the trees has been so filled up that I consider my trees in better order than they were in the fall of 1855; and this remark applies generally in this vicinity, on the shore of Lake Erie.

Cuyahoga county has been distinguished, for years, for the superiority of its location, and the perfect adaptedness of the generality of its soil, for the production of the finest flavor and succession of varieties of this choice fruit.

The loss of the crop, this year, will not be less than $100,000 to this county alone; but two successive failing years have never before been known here, and ought not, and, I believe, will not, deter enterprising and shrewd cultivators from the prosecution of this profitable branch of industry. It is hoped that they will take courage, and re-plant.

The usual life of peach-trees, in New Jersey, and in some parts of New York, only extends to a bearing period of three, or, at most, four years. The period of bearing, in this lake region, extends, with proper cultivation, to twenty years, and this, too, for very fine fruit. An advantage resulting from this seeming misfortune, is, that improved varieties may be introduced, from which the profits will be enhanced, and that the varieties may be abridged to less than half of the number heretofore cultivated.

APRICOTS.

CONDENSED CORRESPONDENCE.

Statement of VICTOR SCRIBA, *of Pittsburg, Alleghany county, Pennsylvania.*

In the central and northern parts of Europe, apricots are generally raised in the espalier form at the sides of buildings or along walls, secure from the north winds. Although the blossoms shoot forth very early in the spring, nevertheless they succeed very well, even in the northern parts of Germany. When in flower, they should be protected from frosts, during the night, with some light covering, as a piece of muslin, or other kind of cloth. This protection is only necessary, however, at the period when the blossom-buds are opening, or the time required for the fecundation of the fruit, as the young drupes are not so easily injured by the late vernal frosts.

In 1854, I planted several trees, from which I raised, last year, some very fine apricots. They sold for 37½ cents a dozen. The varieties I cultivate are, the "Breda," the "Early Golden," and a kind I imported from Europe, the name of which I do not remember.

PLUMS.

CONDENSED CORRESPONDENCE.

Statement of VICTOR SCRIBA, *of Pittsburg, Alleghany county, Pennsylvania.*

In that part of Germany from which I came, plums, especially the "Zwetschen prune," are grown in great abundance, for home consumption, as well as for exportation to Belgium, Holland, and the northern parts of Europe. Some farmers annually raise from 80 to 100 or more bushels of dried prunes. The trees are generally planted along large and small streams, and the water-ditches of the meadows, and in the shade of apple and pear orchards, between the trees, where they grow most luxuriantly. The fruit attain a larger size, and a deeper color, than in more elevated and exposed locations.

From a knowledge of the above-named facts, I was induced, four years ago, to rent a neighboring orchard, in which stood some large plum-trees that had scarcely ever produced any ripe fruit. I dug small holes around the trees, and occasionally filled them, say every three or four days, during the warm season, with rain water, dish-water, or soap-suds, whereupon the trees grew more luxuriantly than before, and, every year since, a good crop of excellent plums has libe-

rally remunerated me. Last season, the crop was larger than any I had ever seen before, on account of the abundance of rain, the plums hanging like clusters of grapes on the trees. One tree of the grafted prune bore about 10 bushels, and they readily sold in market for 8 cents a quart. In 1854, when scarcely any body raised plums in this vicinity, in consequence of the great heat and drought of that year, I had a small crop, which sold in the market at 25 cents a quart. During all this time, I had but little trouble with the curculio, (Rhynchænus,) so destructive to the plum in other regions.

In my native country, plum and cherry-trees are never pruned, except occasionally in removing the dead branches, or in trimming the roots at transplanting.

I would state, that the grafted or budded prune, upon the common plum-tree, degenerates, and is not so highly valued as that raised by cuttings or from seed. I am sustained in this opinion by the observations of the Economists (Rapp's Economy, Beaver county, in this State,) who imported the genuine scions of the prune and grafted them on stocks of the plum.

I procured my Zwetschen plum-trees from Mr. Charles Schmidt, of Winesburg, Holmes county, Ohio, a gentleman who has done a great deal in propagating this luscious fruit in many parts of that State, as well as in Western Pennsylvania. Mr. Pfeiffer, of Indiana, Indiana county, Pennsylvania, also raises prune-trees in great numbers, from the seed, and sells them at good prices. He exhibited some of his prunes at the late State Fair, where they readily sold at 50 cents a quart.

Statement of ABRAM ROSENBERGER, *of Perkiomen, Montgomery county, Pennsylvania.*

Plums are easily raised with us, notwithstanding the ravages of the curculio on the fruit. I have read of many preventives, and tried several. I experimented the last season with mine, and, from observation, am led to believe that air-slacked lime, sprinkled over the leaves of the trees, is a sure preventive. Having a plum-tree on the south side of my bake-house, I commenced strewing air-slacked lime over it as soon as the fruit was set, and repeated it as often as the rain fell. I took care, however, to omit one limb, in order to test the means used, and the result was, that not a single plum was stung by the curculio, except those on this branch, not one of which escaped.

GRAPES AND WINE.

DECREASE OF THE WINE-CULTURE IN PORTUGAL.

BY NICHOLAS PIKE, U. S. CONSUL, AT OPORTO.

Since my communication of the 10th January, 1855, on the "Grape Disease," I have carefully watched its progress, and am now fully prepared to give further information on the subject.

The disease made its appearance early in March, and spread with great rapidity over the whole kingdom. The vines which came under my immediate notice, indicated sickness, and, by the middle of April, the young shoots were spotted, and did not grow with their usual vigor. The leaves assumed a yellowish green, curled, and, during the month, most of them became covered with the *oidium*. The bloom was rather later than usual, and much of the fruit became shrivelled, and dropped to the ground, almost as soon as it was formed. In many instances, after the branches had been well developed, a small black spot appeared on the stem of the bunch where it united to the branch; this gradually extended down the stem, covering the whole cluster with the oidium. Many of the bunches thus affected, dried on the vine.

Throughout the wine district, the disease made its ravages, and it was impossible to find a vine that was not affected. The weather, during the months of May, June, July, and August, was very favorable, and it was generally supposed that the fruit which had escaped early in the season would mature. But, as soon as the berries began to change color, they shrivelled and dried up, and very few cracked open, as those had done the preceding year. The fruit did not contain the usual quantity of juice, was sour and unpleasant, both to the taste and smell; almost all of it, when nearly matured, began to rot on the vines, and many farmers, to save what remained, gathered and made it into wine.

In ordinary years, about 21 baskets of grapes make a pipe of wine; but, on pressing the grapes of this year's vintage, it was found they contained so little juice, that double the quantity of fruit would be required to make that measure of wine. To supply the defect, in many cases, water was added to the "must." Throughout the month of September, there were excessive cold rains, and the little fruit remaining on the vines was almost totally destroyed. I believe there was not a bushel of good healthy grapes produced in the wine district last year.

The produce of the wine region of the Douro has, within a few years, reached as high as 100,000 pipes. The usual quantity, however, is about 80,000 pipes. In the year 1855, there were produced about 7,000 pipes Although 26,600 pipes have been enrolled at Regoa, much of this wine has been brought from the adjoining districts, and will be mixed with *geropiga*, *sugar*, *elder-berry*, &c., and brought down the river to Oporto, and exported to different parts of the world as Port wine.

The great falling off of the produce of a number of well-cultivated vineyards in the wine district of the Douro, is seen by the following table:—

Vineyards	Pipes produced in regular years.	Pipes produced in 1855.
No. 1.	150	30
2.	140	60
3.	140	2
4.	200	60
5.	200	25
6.	80	10
7.	35	2
8.	60	6
9.	105	3
10.	80	2
Totals.....	1,190	200

The total amount of wine at Villa Nova, on the 1st of October, 1855, did not amount to the "one year's" production of the Port-wine vintage of 1847. Of this stock, a very large proportion consists of wine of the vintages of 1850 to 1855, inclusive, which, notwithstanding its very doubtful quality, cost double the price of the vintage wines prior to the year 1850. Those of 1855 are all void of body, harsh to the taste, and require a large quantity of brandy to keep them sound.

The quantity of Port wine, exported from this place, in the year 1855, was as follows:—

	Pipes.	Almudes.	Canadas.
Brazil,	3,644	12	6
Bremen,	103	20	8
Canada,	605	20	6
Denmark,	435	12	1
France,	27	13	8
Great Britain,	26,755	11	11
Hamburg,	1,076	0	10
Morocco,		15	6
New Foundland,	189	19	9
Portuguese Possessions,	317	6	8
Prussia,	256	3	8
Spain,		13	3
Sweden	288	14	2
United States,	683	15	9
	34,386	12	11

This great falling off of the vintage has caused much distress throughout the wine districts of Portugal, and more especially in the rugged and rocky hill-sides of the Douro, which are adapted only for the cultivation of the vine and olive.

ON THE MANUFACTURE OF CHAMPAGNE WINE.

BY D. PONCE, OF MOUNT ZION, HANCOCK COUNTY, GEORGIA.

As I have not noticed, in the Patent Office Reports, any information relative to making Champagne wine, as it is manufactured in France, it has occurred to me that the proper mode has not been adopted in the United States. The celebrated Catawba Champagnes, of Ohio, do not, as far as they have come to my knowledge, retain their effervescent quality so long as those imported from abroad. I have tasted some two years old, which was quite sparkling; while others, at four years of age, when opened, were perfectly still. I have also made some Champagne myself, which has been attended with the same result.

The following method of making Champagne, as practised at Châlons-sur-Marne, by M. Jaquesson, one of the largest manufacturers in France, may be useful to those who are engaged in wine-making in this country:—

When the fruit is gathered and pressed, the juice is exquisitely sweet, but, in a few days, this is changed by fermentation in the casks in which it is placed. When fermentation subsides, the wine is vapid and very disagreeable. It is then stopped, and fined to as great a degree of brightness as can be obtained before the bottling season, which is usually in March following the vintage. When it is put up, a second fermentation is induced by putting into each bottle a small glass of what is called "liqueur" (sugar-candy dissolved in wine and fined to brightness.) This fermentation produces a fresh deposit of sediment, or lees, however bright the wine may be when bottled. In this process, the greatest attention is necessary, and the bottles are closely watched, the temperature of the air being carefully regulated, to promote or check the fermentation; yet thousands of bottles explode, so that at least 10 per cent. is charged as a cost of manufacture; in seasons of great and sudden heat, 20 or 25 per cent. are broken. When the wine, after clouding with fermentation, begins to deposit a sediment, the bottles are placed, with the necks downward, in long beds or shelves, having holes obliquely cut in them, so that the bottoms are scarcely raised. Every day, a man lifts the end of each bottle, and after a slight vibration, replaces it a little more upright in the hole; thus detaching the sediment from the side, and letting it pass towards the neck of the bottle. This is done for some time, until the bottle is placed quite upright, and the sediment is entirely deposited in the neck of the bottle, which is then ready for "disgorging." In this process, a man holds the bottle steadily,

with the mouth downwards, before a recess prepared for the operation; cuts the wire, when the internal force drives out the cork, and with it the foul sediment. The skill of the workman is shown in his preserving all the pure wine, and losing only the foul. There is an indescribable manipulation in this. Another cork is ready to replace that blown out, the bottle is filled from some previously purified wine, and again stacked. A second disgorgement is always necessary, when the wine is prepared for sale; sometimes a third. When ready, it is sweetened to suit the taste. This preparation is, in fact, a second disgorgement. But the wine now gets another dose of liqueur, which is prepared with great care and purity, of candy, dissolved in white wine for the ordinary Champagne, and red wine for the pink, and the coloring thus given is sufficient. The quantity put into each bottle depends on the market for which it is intended—generally a good wine-glassful. This gives it the exquisite sweetness, and aids its quality for sparkling when opened. It may be added, that in the last operation, the corks should be well compressed before they are driven into the bottle.

The above was procured from a friend, who lately travelled through the Continent of Europe.

THE GRAPE-CULTURE IN NORTHERN OHIO.

BY JAMES HOUGHTON, OF EAST CLEVELAND.

Within the past eight years, the culture of the vine has received much attention in this county, in consequence of the various horticultural exhibitions having brought together specimens of this fruit from the prominent grape-growing districts of the State, and demonstrating that, in the region of Lake Erie, but more particularly of Cleveland, the "Isabella" grape had been found in the greatest perfection, alike in the profuseness of its bearing and the largeness of its berry; and, also, because it was not liable to mildew, as in other districts, and yielded larger profits to the cultivator than any other fruit.

The "Catawba," as an open vineyard grape, is not so well adapted to this locality, as it requires a longer season to ripen; neither is its product so great, although, considering the excess of clear juice it affords beyond that of the Isabella, its increase in value, in the estimation of the growers here, must follow, from the fact that it is the "Wine" grape. Even this variety is here produced in finer clusters than in Hamilton county, and, from the warmer nature of the soil, contains more of the vinous quality than the product of the clayey hills of the Ohio river.

The "Clinton" has been tried to a limited extent, but is too rambling a grower to be profitable for vineyard purposes. Its berry is small also. I have a vineyard of 7 acres, directly on the Lake shore, which has been planted for five years, in rows 10 feet apart, and 10 feet from vine to vine. But this is occupying more ground

than is necessary, and I purpose planting another vine in each space in the row. I have also an acre planted 5 by 6 feet apart, which, I am inclined to believe, is as near as they ought to be on level ground, where the air does not circulate so freely as on the steep hill-sides.

I train to stakes. Those at 10 feet allow four stakes, 6 feet out of the ground; then the intervening one, intended to be planted, will give two stakes to a vine. Some growers are training upon trellises of wood-slats, four of them on five-foot posts, and a few on wires; but I perceive a practical objection to trellises, in large vineyards, as lessening the free circulation of air amongst the vines, which is absolutely required for the production of fine fruit and well-ripened wood.

I have had eighteen years' experience in raising fruit in Cleveland, and remember that the remark commonly made in former times was, that fruit, but especially grapes, would not remunerate the culturist. At the beginning of this period, fine grapes were sold at from 4 to 6 cents a pound. I have raised and sold them annually during this time, and, in 1854, I sold, from 8 to 10 cents a pound, enough to realise $1,280, besides producing 270 gallons of wine. Although there are over 200 acres of vineyard, now planted in the vicinity of Cleveland, the market is not so well supplied as it was five years ago; for large quantities are sent to Eastern and Western markets, by express, on the different railroads, and can be transported with as little injury to the grape as would occur to any other fruit. They can be packed in bulk, in Champagne baskets, and kept in fine order for a week, in transportation.

The small expense of planting vineyards, in Cuyahoga county, literally astonishes the vine-growers of the southern part of the State. With them, the estimated expense of vines, trenching the land, and planting, is an average of $500 to the acre. In this county, with deep ploughing, aided by a subsoil plough, and planting out 5 by 6 feet apart, about 1,400 yearling vines, the cost is only $85 an acre. The soil is easily worked, and a vine raised upon a short cutting, of only two, or at most three buds, or eyes, and planted at an angle of 45°, encouraging the growth of the roots to a depth of 15 inches below the surface, and running directly between the rows which this angle will give, and thereby receiving the full power of the sun's heat, will produce a higher flavor and finer fruit than can be obtained on the high hill-sides, where almost perpendicular planting is necessary, with deep trenching. In view of the facts here presented, the attention of vine-growers ought to be directed to the Lake region.

Much has been said and written about the application of artificial manures to the grape, and much that is erroneous. The Catawba and Isabella vines do not require such sustenance, and the representations that have been made have deterred many from going into this branch of cultivation.

Grape-growing is yet in its infancy, with us, but it bids fair to equal, or excel, any of the branches of rural industry pursued in this country. Although, as yet, comparatively little wine has been made in this county, it has been sufficient to establish its excellent quality. Ohio State premiums having been awarded to the northern part of the State.

CONDENSED CORRESPONDENCE.

Statement of ADOLPHUS ENGELMANN, *near Belleville, St. Clair county, Illinois.*

The "Catawba" grape has been cultivated to some extent in this region, and the wine made from it is most excellent; but the yield, owing to late frosts, mildew, summer rot, and insects, has been quite uncertain; and the attention of wine-producers has been directed to the discovery of some other kind of grape, less liable to injury from these causes.

The "Isabella," "Bland" and "Fox" grapes are also known here, but are not considered of sufficient merit to supersede the Catawba.

Statement of JOHN S. REID, *of Connersville, Fayette county, Indiana.*

The culture of the grape, in the White Water valley, is rapidly extending, and promises, at some future day, to be an article of domestic luxury, if not of commercial importance. In the adjoining county of Franklin, which contains a large German population, the grape is also cultivated, in almost all their gardens, besides in many small vineyards ranging from 1 to 5 acres each. Judge McCarty, a resident of that county, has two vineyards, under the charge of an intelligent German, from which, this season, he will make about 30 barrels of wine.

From my own vineyard, containing about an acre, set with the Catawba grape, I have made 150 gallons of excellent wine, which brought me, in Cincinnati, $1 25 a gallon, when only six months old. I have several varieties of the grape in my collection, among which is the "Sweet Water," or "Early Muscadine," and the "Mammoth Catawba," an excellent large grape of the Catawba kind. I am experimenting with a hybrid, or cross, between these grapes, in order to produce a fruit that will combine the best qualities of the two. The "Isabella" is considered good only as a fruit for the table, the wine not being so rich, nor so palatable, as that made from the Catawba, although of greater yield.

A gentleman, some time ago, presented me with several slips of what some call the "Early Harvest," the fruit of which ripens by the end of August, or the beginning of September. It is larger and rounder than the Isabella, of a light-purple color, inclining to an amber shade. It is very sweet and juicy, with a strong musky flavor. Whether it will prove good for wine or not, I cannot now say, although I think it will answer well to mix with other wines, such as the Isabella or Catawba, but I have never heard nor seen any grape for wine equal to the latter. All my grapes grow in the open air, and are sustained on upright posts, about 7 feet high, and 4 feet apart. In trimming, the spur and renewal system is followed, which

keeps the vines always young and vigorous, although I think it renders them more liable to early as well as late spring frosts. My vineyard, this season, so far as fruit-bearing is concerned, was nearly ruined by the frost of May last, but in the making of wood for another year, it shows well

Several gentlemen, of this vicinity, have vines of the "Charter Oak" grape, said to be a native of Connecticut, the fruit of which grows almost as large as a plum, and has the hardness of a Siberian crab-apple

The mode adopted by me of making wine, is as follows: From the 1st to the 15th of October, I continue pulling the grapes, always selecting the ripest ones first, and, after mashing them in a tub made for the purpose, subject them to a small press made in the form of a cider-press. The barrels, into which the juice is put, are well washed with cold water, dried, and fumigated with sulphur, before the "must" is put into them. I then place over the bung-hole a piece of tin, or sheet-iron, perforated with small holes. The must is then allowed to ferment slowly for about three weeks, until the scum, caused by the fermentation, apparently ceases. The barrels are then filled and bunged tight, until spring, when I rack the wine off into clean casks, washed out with cold water and juniper berries, and fumigated with sulphur as before, in order to destroy any bad flavor. It is then ready for market; but, during this time, the casks require to be frequently examined, and filled up, keeping them always full to the bung.

Statement of FREDERICK MUNCH, *of Marthasville, Warren county, Missouri.*

The culture of the grape, in this State, is progressing rather slowly, when compared with the ardor devoted to it some eight years ago, in consequence of the numerous failures from disease, which are confined principally to a few varieties. I have, growing promiscuously in my vineyard, about a dozen sorts, eight of which are certainly exempt from the rot, irrespective of the weather or seasons. The "Catawba" and "Isabella" suffer the most from disease.

By recent observations, I have learned to make an important distinction in the vines. All the native varieties, on which I have experimented, produce a fruit of a dark-blue color; but, by pressing this fruit, it is found that the juice of some is colored very little, if at all, while that of others produces a wine of the true purple color. It is only the latter varieties which contain that astringent principle characteristic of all genuine red wines. From this circumstance, I shall propagate no other.

The varieties referred to above are the "Little Ozark," the "Waterloo," or "Rock House Indian," and the "Ozark" seedling, the latter of which I have raised from seed brought from the Ozark mountains, in 1851. Its berries are of a medium size, the clusters compact and conical in their shape. It may be regarded as a supe-

rior variety in every respect. This year, I have made a red wine from each of these varieties, of a peculiar aroma and taste, which, by connoisseurs, is judged to be not inferior to the best red wines imported from France. These vines are all good bearers, under proper treatment, grow vigorously, and remain sound wherever they may be planted.

Statement of D. MINIS, *of Beaver Plain, Beaver county, Pennsylvania.*

The "Isabella" and "Catawba" grapes are cultivated here, to a limited extent, for table use, but not much for wine. It is doubtful whether wine-making can ever be made profitable with us. Our climate does not ripen the grape very well, nor equally, every year.

Statement of VICTOR SCRIBA, *of Pittsburg, Alleghany county, Pennsylvania.*

In 1855, I imported some choice varieties of grapes, for table use, among which were the "Frankenthaler," with a beautiful blue berry, larger than a cherry, growing in bunches more than a foot in length; the "White Leipsic;" the "Gutedel;" the "Blue Burgundy;" the "Muscat rouge;" and the "Fontainbleau noir." I selected these kinds, in preference to others, as most delicious table fruits, and on account of their standing a cold climate better than any others. They are the sorts principally grown in the northern part of Germany, and I have occasionally seen some of them doing well in this section of the county, especially the Frankenthaler and the Gutedel.

For wine-making, I prefer the "Catawba" to any other grape. The imported varieties, for this purpose, will not succeed very well, as frequent experiments have shown. The "Isabella" is an inferior grape for the table, or for wine, but much hardier than the Catawba, and, for this reason, is preferred by many. The latter, being a late grape, should be trained very low, in this latitude and elevation, in order to bring it earlier into simultaneous ripening. It should be pruned after the "Rockschnitt" method, as adopted in the north of France, and, with success, of late, in some parts of Germany, as well as in the vineyards about Cincinnati.

Within the last two years, the vine has been cultivated to some extent in this vicinity, principally by Germans. According to the best information I can obtain, between 40 and 50 acres have been planted in this immediate neighborhood, chiefly the Catawba, on the hill-sides, facing the Alleghany, Monongahela and Ohio rivers, most of which, however, are near the banks of the former. The wine made from the Catawba, as well as from the Isabella grapes, is good and praiseworthy, and sells from $1 to $2 a gallon.

THE OLIVE.

CONDENSED CORRESPONDENCE.

Statement of ROBERT CHISOLM, *of Beaufort, Beaufort district, South Carolina.*

My olive trees were imported from the neighborhood of Florence, by the way of Leghorn, in 1833, and consist of two kinds, the "Small Round," esteemed best for oil, and a much larger and more oval-fruited sort, which turns white before it becomes purple, the latter having been sent as stocks to engraft the other upon. The winter of 1834–5 was an excessively cold one, and injured to the roots, all the orange-trees in the South, and some of them so severely that they never afterwards sprouted; yet I do not recollect that my olive-trees suffered at all—certainly none were killed. No cold, which we have experienced since, has ever caused them to shed a leaf, whereas, in repeated instances, our orange-trees have suffered much, and, about four years since, barely escaped being again killed, to the ground.

My olive-trees are planted in a rather flat, clayey piece of land, quite near the salt water, and but little elevated above high tides. In Italy, I believe, it is generally thought that this tree does not thrive well far from the sea; but does best on what they call a "fat soil," which contains more or less clay. From what I have seen of it on sandy soils, in this vicinity, it has proved not very fruitful.

Finding that my trees grew very slowly, and not expecting to derive profit enough from them to pay for their culture, the idea occurred to me of trying to cultivate the sweet-potato, field and cow peas, among them, hoping that the expense of cultivating the olives might be covered by these means. The land, therefore, was well manured every year in June, and cultivated with one or other of these crops, in such a manner as the other operations of the plantation would render convenient, generally, however, with sweet potatoes, irrespective of rotation. The result has much more than answered my expectations, as I very seldom failed to make a fair crop of potatoes, and the trees have grown vigorously, and rapidly come into bearing, and, what I did not expect, they have continued to bear good crops of fruit every year, occasionally abundant ones, while, in Europe, the habit of almost every variety of this tree is to bear only in alternate years.

As the olive ripens, during the months of October and November, at a time we are straining every nerve to save most of our other crops, no attempt has ever been made to gather all the fruit; but, one year, enough was gathered, pounded in a mortar, and the oil pressed out, to justify me in saying that, I produced a very clear and good-looking article which was exhibited about two years since at, the Fair of the South Carolina Institute. The only use that has thus far been made of the olives is to pickle them, while green, in a full-grown

state, in August or September, for which purpose they seem admirably adapted. A few may now be found on sale, which are preferred to those imported. The receipe for pickling was obtained from France, and is as follows:—

"For each pound of the fruit, take a pound of good strong ashes, (those from the hickory wood are the best we have,) and an ounce of good slacked lime; mix the lime and ashes with water, until a soft paste or mortar is formed, into which stir or imbed the olives, and finish by covering the whole mass with a layer of dry ashes. Let them remain in this state until all the bitumen is extracted, which may be known by the stones slipping readily out of the pulp, when squeezed between the fore finger and thumb, for which purpose a few may be tried once an hour, or oftener, if desired. The length of time required for this, however, will depend entirely upon the quality of the ashes and lime, and may vary from two or three hours to as many days. As soon as the olives have been deprived of their bitterness, they must be cleanly washed, and put to soak in fresh water, which must be changed about once an hour, for twenty-four hours, when the taste of potash will have been removed, and the water cease to be discolored. The olives must then be put into bottles or jars, and a strong brine put over them, made from good rock or alum salt. This brine will generally require to be changed several times, in consequence of becoming ash-colored, after which, the bottles must be sealed air-tight; and, if kept in a cool, dry, dark place, the olives will keep good for years."

Olives carefully cured after this plan, will be found less salt than those pickled in France, which are usually sold in this country, and will retain much of the nutty flavor of pure olive-oil.

I do not think that the making of oil from the olive will be likely to prove sufficiently profitable to be pursued in this country, for many years, as labor is too expensive, and other crops will necessarily take the lead, unless the price, of labor or soil in Europe should be increased, when there will consequently become a greater demand.

THE JUJUBE TREE.

CONDENSED CORRESPONDENCE.

Statement of ROBERT CHISOLM, *of Beaufort, Beaufort district, South Carolina.*

In 1837, while traveling in the south of Europe, I was induced to purchase some plants of the jujube, which I have cultivated ever since; and, as this shrub suckers freely, I have considerably increased my stock, though to nothing like the extent I might have done, had I been disposed. It appeared to me to have been many years before my imported trees had come into bearing; but those propagated from

suckers, produced fruit much sooner, and have thus far proved more productive.

With us, this shrub is deciduous, stands the climate well, and does not appear to be at all fastidious about the soil in which it grows. It is quite ornamental, when in leaf, and is delightfully fragrant when in bloom. Like most other fruit-trees, it usually bears most abundantly in alternate years; but, this probably might be remedied by pulling off the young fruit from a part of the tree the fruitful year, in order to allow it to rest and bear the next. The fruit is about the size of an olive, having rather a husky skin, like the date. It has a very pleasant, nutty taste, and, when eaten relieves a cough. A few trees should be cultivated on every plantation and garden of the South

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THE FILBERT.

CONDENSED CORRESPONDENCE.

Statement of VICTOR SCRIBA, *of Pittsburg, Alleghany county, Pennsylvania.*

Last year, I imported a favorite kind of filbert, or hazel-nut, (*Corylus tubulosa*,) and hope to multiply it in a few years. It is decidedly to be preferred to most other nuts growing in this country, being hardy enough to withstand the cold of Germany, and, doubtless, would be adapted to the climate of the middle portion of the United States, as well as to that of the South.

THE CURRANT.

CONDENSED CORRESPONDENCE.

Statement of JOHN DANFORTH, *of New London, New London county, Connecticut.*

For tnree or four years I have cultivated the red currant in considerable quantities. The past season, I sold 50 bushels at $2 a bushel.

THE NEW ROCHELLE BLACKBERRY.

CONDENSED CORRESPONDENCE.

Statement of JAMES W. FAULKNER, *of Stamford, Fairfield county, Connecticut.*

The "New Rochelle" blackberry bids fair to be one of the staples of our country. Bushes, two years old, frequently yield from 4 to 6 quarts each.

MELONS.

CULTIVATION OF THE WATERMELON AT THE SOUTH

BY HAWES H. COLEMAN, OF CACHEMASSO, ARKANSAS.

In the cultivation of watermelons, the first point is to procure good seed, as there is much difference in the varieties. One which I have kept since 1827, I think superior to any other, in the following particulars: First, it is the earliest bearer; second, it is the longest; third, it is of the most convenient size, the half being sufficient for a healthy man to eat at one time; and, fourth, it is superior in juice and pulp to any other I have seen. While some object to its small size, they seem not to be aware of the fact that large melons are long in maturing, and soon gone. It is better to have ten good melons, of proper size, fully developed and matured, ripening through two months, than to have two or three coarse ones which are hard and white in the heart, and all gone in a week.

The time of planting, in this section, is about the 5th of April. The best plan is to dig a hole 18 inches square, and of the same depth, and fill the hole with rich earth from the woods, elevating the hill 6 inches above the surface. As soon as the April showers have started the plants, throw a bushel of cotton-seed around each hill, or, in default of cotton-seed, use decayed leaves, covering slightly with earth. The hills should have two vines to each, and be 12 feet apart. Draw up the earth, so as to make the hill the highest point in a circle of 12 feet in diameter. In a dry season, this method will protect the hills, elevated as they must be to get an early start; in a wet one, the surface declining every way from the hill, will carry off the excess of water. Melons need all the ground they occupy. The smallest weeds affect them. They require all the sunshine that falls on the plat in which they are planted, and every breeze that sweeps over them, and that the soil should be light and well worked.

I have three varieties of melon: First, the "Coleman," which I have planted for twenty-nine years. It is long in shape, striped, green, having a thick rind, with a red meat and seeds.

The "Rattlesnake" melon is my next variety. It should be planted in hills 12 feet or more from centre to centre, on land properly prepared. It takes its name from its resemblance to the rattlesnake. It is moderately large, weighing from 20 to 40 pounds. The seed is almost white, the rind thin and brittle, and the meat red. It is larger and more beautiful than the Coleman, but inferior in flavor.

The "Bough" melon is my third variety. It is cultivated in the vicinity of Richmond and Baltimore. From its size and red meat it commands a ready sale in market. It is long, and white-skinned, and has red meat and seed, and is brittle in the rind.

CONDENSED CORRESPONDENCE.

Statement of JOHN T. C. CLARK, *of Washington, District of Columbia.*

In order to have melons in perfection, each variety should be planted remote from all other plants of the natural family to which it belongs, such as every other variety of melon, and the cucumber, gourd, squash, pumpkin, &c.

The fruit should be cut crosswise, and the seeds taken from the end next to the stem or vine. If taken when just ripe, the next crop will be found to be less impregnated with other sorts than those saved in the ordinary way.

THE PLANTAIN AND THE BANANA.

CONDENSED CORRESPONDENCE.

Statement of JOHN B. C. GAZZO, *of La Fourche parish, Louisiana.*

The plantain (*Musa paradisiaca*) and the banana (*M. sapientum*) differ but little in appearance, but the fruit of the latter is somewhat smaller than that of the former. The stalks, or trunks, grow from 12 to 14 feet high, springing from a large pear-shaped bulb of a shining green color. The leaves are about 4 feet in length, 1½ in breadth, very thin and soft, and of a delicate green. The fruit grows at the top of the stems, in clusters, frequently containing, in the plantain, from fifty to eighty, and, in the banana, from eighty to one hundred, weighing from 55 to 60 pounds to a cluster. The fruit of the plantain grows from 10 to 12 inches in length, curving inward at

the extremities, and is about an inch and a half in thickness. The flesh is firm and solid, and may be prepared, for eating, when green, by roasting, frying, or boiling. The banana may be cooked in the same way, when green, or may be eaten raw, when ripe.

The plantain and banana may be propagated from cuttings of the roots, which grow with facility where the soil is rich. Perhaps there are no other plants on the globe which produce so much nutriment as these, in proportion to the space they occupy.

LIVE FENCES.

CONDENSED CORRESPONDENCE.

Statement of WILLIAM N. WHITE, *of Athens, Clark county, Georgia.*

The single white "Macartney" rose, I find, in this region, forms an excellent hedge. The double-flowered variety is also good for the purpose, and has the advantage of the beauty of its flowers, but I think the single one preferable in ease of management.

This plant is an evergreen, with us, and is easily grown from cuttings. It is very thorny, and of beautiful foliage. It never dies out at the bottom, whether pruned or not, and is very hardy, and of luxuriant growth. The most satisfactory fence can be made with this, by setting good chestnut or cedar posts, 8 feet apart, with their small ends charred and planted 2½ or 3 feet in the ground. Upon this, form the usual paling fence, or nail a good wide bottom-board, and finish the fence with stout wire, strained through holes in the posts. The wire fence may be 4 feet high. The plants should be rooted cuttings, and may be located at first, even 8 feet apart, and by layering and training the bottom shoots, if the ground is kept in good order, in three years, it will repel every intruder. It is better, where plants are abundant, to set them out 4 feet apart.

This hedge requires less pruning than any other to keep it impenetrable. The holly would also make an efficient and beautiful hedge, were it not so difficult to transplant. My own hedge of Macartney rose, when three years old, trained on a common fence of rails and palings, forms a barrier perfectly secure, and has proved very ornamental.

Statement of STEPHEN A. LINDLEY, *of Monroe, Jasper county, Iowa.*

The "Osage" orange hedge-plant is receiving great attention in the middle and southern parts of this State. While some are sanguine of its entire success, others are disposed to regard it as a vain speculation. The difficulties in growing a good hedge are neither few nor slight. Some writers affirm that the plant has no enemies; but this

I know from experience to be erroneous. The "Chinch" bug, (I know no other name for it,) a minute insect, of disagreeable odor, like a bed-bug, exists in great numbers in our light prairie soil. It appears to breed upon a kind of knot-grass. It often preys upon late crops of spring wheat, and has destroyed at least 50,000 of my plants this season. It attacks plants from 1 to 3 inches high, when the roots are white and sweet.

The Osage plant has, at all periods of its growth, a tap-root, longer and thicker than the top or stem. The bug eats off the bark, some distance below the ground, and either kills it, or so checks its growth that it is worthless. At a later stage, the gopher, an animal of the mole species, but much larger, will cut off any Osage orange root that it finds in its way. Plants, with stems more than an inch in diameter, may be seen in some of our older hedges, dry and dead. They may be easily lifted out of the ground, when it will be seen that the gopher has cut them off a few inches below the surface.

The ravages of the bug may be in a great degree avoided, by planting in new ground, broken the year before; but the gopher is an enemy much more difficult to defeat, as no part of the State is free from it, and, in the newer portions, it is very abundant. The best defence against its ravages is a good steel-trap. If a trap be properly set in its path, it will rarely fail to step into it. Poison is sometimes used; but, besides being dangerous, it is not so certain. The gopher does not feed on the roots of the Osage orange, as it does on that of the hickory and some other trees; but it is a most determined burrower, and, when constructing its subterranean highways, will turn aside for nothing that will yield to its strong, protruding front teeth. In cleaning out barren lands, near the timber, roots, 2 or 3 inches in diameter, will often be found cut off by them.

Those who have had most experience in hedge-growing are nevertheless willing to devote time any money to the business. The first experimenters were without information or practical knowledge, and many, of course, failed altogether. The plants are now raised by nurserymen, who sell them in most cases to those who have large contracts for fencing, at so much per rod. As the contractors agree to furnish, set out, and tend the plants, till a good fence is produced, at the rate of $100 a mile, it is probably the best plan for all concerned, since experience has shown that any business, when reduced to a system, is better conducted by each one having his own appropriate work to do.

Statement of D. F. MAURICE, *of Brushville, King's county, New York.*

The "American Arbor-vitæ" (*Thuja occidentalis*) makes the finest ornamental hedge known to this climate. It is indigenous, growing abundantly on the banks of the Hudson. It requires pruning every year, attains any required height, and is very compact and beautiful. I have hedges of from 2 to 14 years' growth, from 1 to 10 feet high, that will compare favorably with any in this country or in England. It is easily cultivated, and readily increased by layers.

If the hedge is for ornament, considerable care and labor should be bestowed on it. It requires two men for a month, each year, to trim mine, which are about 1,200 feet in length. If the hedge is simply for protection, and is to be trimmed, as in England, with hedge-hooks, three or four times as much may be done in the same time. It is essential to success that all hedges be pruned once every year, and it is more easily done in August than at any other time, the wood then being tender and easily cut. No one should plant them who is not willing to give them this attention

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Statement of D. MINIS, *of Beaver Plain, Beaver county, Pennsylvania.*

But little attention has been as yet bestowed on live fences in this section of the State, as timber of the best quality has been abundant from the first settlement of the country, and the want of a substitute is not generally felt.

The Osage orange, thus far, bids fair to be the best for hedges of anything that has been tried. From my own experience, I know it will withstand our coldest winters, as well as severe drought, like that of 1854. This plant has already perfected its fruit with me, and I have a quantity now growing from seeds raised by myself.

Statement of ROBERT W. BAYLOR, *of Wood End, near Charleston, Jefferson county, Virginia.*

The Osage orange makes a good handsome fence here, in four years. The cost of plants and setting is 25 cents a rod; trimming 12½ cents a rod, per annum.

The plants should be cut close to the ground the first two years; the third year, they may be clipped 18 inches above the ground; and the fourth year, at about 3 feet in height; then suffered to grow at the rate of about 18 inches a year, until they acquire the requisite height. Neither frost nor drought affect the plants after the first year.

CLIMATOLOGY.

THE COTTON DISTRICTS OF THE GLOBE CONSIDERED WITH REFERENCE TO THEIR CLIMATES.

[Deduced from authentic sources.]

On inquiring into the climate best suited to the cultivation of cotton, we must remember that we have to pay attention, not only to the air, but also to the vapor. These may be considered in some respects as forming two distinct atmospheres; the one uniform in quantity, and in the proportion of its ingredients, but ever-varying in temperature; while the vapor varies not only in this respect, but in

the quantity in which it is present, and also in its point of deposition, when alone it becomes perceptible as moisture.

Cotton is cultivated in so many countries, that we cannot but expect it to be capable of flourishing in considerable diversities of climate. Thus, the rich alluvial lands of the Mississippi differ not only in soil, but also in temperature and dryness, from the sandy fields of Georgia. In dryness, both must differ from the uniformity of moisture which prevails in the islands where Sea Island cotton is produced. Some grows naturally in the warmer parts of Mexico, as well as in the countries situated along the east of the Andes; and much is cultivated in the moist parts of Guiana and Brazil. Humboldt has seen it at 900 feet of elevation in the equatorial Andes, and at 5,500 feet in Mexico. But here different species may, perhaps, be included, as we know that which yields Pernambuco cotton is cultivated in many parts of South America. In the Old World, we find cotton growing in the interior, both of Africa and of India, where there must be considerable dryness of climate. It is cultivated with some success in Egypt, and also, of late, in Algeria, and near Port Natal, in South Africa; but, in the two former, only by the aid of artificial irrigation. It is produced in various islands of the Indian ocean, in many parts of China, and in almost every part of Continental India. Thence it may be said to extend into Persia, Asia Minor, and to the southern parts of Europe, including the islands of the Mediterranean, whence the English manufacturers received their earliest supplies of cotton.

Within these limits, extending from the equator to 40° of latitude, we know that there are considerable diversities of climate; but the heat of summer, in many of these localities, does not differ so much as might be expected from their latitudes. The temperature of tropical regions is known to be modified by the amount of moisture, while that of the interior of continents, even in high latitudes, is increased by the greater clearness of sky, which is dependent on the comparative absence of moisture. This cause tends to increase even the cold of winter, from the more free radiation which takes place at night in a cloudless atmosphere. Humboldt has remarked that *Gossypium barbadense, hirsutum,* and *religiosum,* have each their favorite climate, from 0° to 34° of latitude, where the mean annual temperature is from 82° to 68° F., but that *G. herbaceum* is successfully cultivated in the temperate zone, where, with a mean summer heat of 73° to 75°, the mean of winter is not less than 46° or 48°.

But, in taking a general survey of the localities where cotton is chiefly cultivated, we should observe that many of them are in islands, and others in the vicinity of the sea. This is certainly the case with the districts where the finest cottons are produced, and the largest returns to the acre obtained. It has frequently been stated that the beneficial effects of such localities are chiefly due to the presence of salt in the soil, or to its being carried up in the spray, which is transported, by winds, into the interior. Koster, in his "Travels in Brazil," states, on the contrary, that "the districts which are universally allowed to be the best adapted for the growth of cotton, are far removed from the sea-coast, arid, and oftentimes

very scantily supplied with water; also, that the opinion is very general, that the cotton-plant will not thrive in the neighborhood of the coast, and also that plantations were yearly receding further into the interior, the soil preferred being a deep-red earth, which becomes extremely hard after a long interval without rain." Something, no doubt, must be owing to the species which is cultivated, and to the climate of the plantation being more or less moist. Thus, Spix and Martius, in their "Travels," state that "the cotton-tree cultivated at Rio de Janeiro (*G. barbadense*—sometimes, but, more rarely, the *G. herbaceum*) thrives very well, but is stated not to furnish such durable materials as that in the higher and drier districts of Minas Novas.'

Proximity to the sea has, however, other peculiarities besides the facility of affording saline ingredients to the soil or to the atmosphere. It participates, to a certain degree, in the peculiarities of an insular climate; that is, in greater uniformity of temperature than is found in places further in the interior, and in the freer circulation of air from the usually alternating land and sea breezes. There is also greater equability of moisture; for air, passing over the surface of the sea, necessarily takes up a larger proportion of water. This it does not immediately deposit on the coast, unless it is backed by hills, because it usually becomes a little warmed by the heated land, and is then capable of taking up more moisture. But, as it reaches the coast in a comparatively moist state, it necessarily rather checks than favors excessive evaporation, and thus does not force the foliage, exposed to its influence, to give up an undue quantity of moisture. This, however, is necessarily the case whenever a dry current of air passes over the surface of the leaves. To the influence of moisture, therefore, we must ascribe the more luxuriant vegetation of some sea-coasts, and of many tropical islands.

Baron Humboldt and Professor Dove have pointed out that, while Europe has a true insular or sea climate, both in winter and summer, North America inclines to a continental one in winter, and, in many parts, to a sea climate in summer; that is, it has a cold winter, with a cool summer, with the exception of certain districts, which are excessively hot. But Northern and Central Asia have a true continental climate, both in winter and summer, or a cold winter and a hot summer. Notwithstanding this, we must also recollect that, though each locality may participate in the characteristic climate of its continent, all places near the coast will have more or less of an insular climate, while those in the interior have such as are of a continental nature, though in varying degrees.

The different varieties of cotton cultivated in the United States are believed to belong to one species; that is, that the "Georgian," or "Short-staple," is the Sea Island, carried into the interior; and that the "Sea Island" itself was originally introduced from the Bahamas, or, more remotely, from Anguilla, one of the West India Islands. The "New Orleans" does not differ specifically from the Sea Island cotton, and is admitted by the planters of the South to be identical with the plant of Mexico, whence they procure their finest seeds. It is conjectured that it was from the neighboring coast of Mexico that the indigenous cotton of that country was introduced into the West

Indies, and thence taken to the Island of Bourbon. Hence we may account for *Gossypium barbadense* being identical in species with the New Orleans and Sea Island, as well as with the Bourbon cotton.

The Mexican plant is not a native of the temperate regions of that country, but of the *tierras calientes*, or hot districts. It is produced, for instance, in the neighborhood of Vera Cruz, and is represented as growing spontaneously near Valladolid, a town situated on the great plain of the Peninsula of Yucatan, described by Humboldt as one of the warmest regions in equatorial America. Mr. Stephens states that the spontaneous growth of cotton around that town had led to the erection of a cotton factory in the place. Mr. Norman, in his "Rambles in Yucatan," says: "The cotton plantations, or, rather, the districts where the material is raised, that is consumed in the manufactory in this city, are to the north, and known as the Tizemen district. The same spot is seldom cultivated for two successive seasons. After the crop is gathered, the ground is suffered to be overrun with weeds and brushwood, which, when years have elapsed, are cut down and burned, and the field is replanted." This rude method of culture is adduced only to show how little attention is paid to the plant in its native country. But, as it is desirable to know something precise respecting the climate of one at least of its native districts, we take from Professor Dove the subjoined notice of the means of observations made at Vera Cruz for thirteen years. This town, situated on the coast, in latitude 19° 12′ N., and in longitude 96° 9′ W., has a mean temperature of 77°.02 F., with a difference of only 12°.42 between the hottest and coldest months, thus:

Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
69.98	71.60	73.40	72.17	80.48	81.86	81.50	82.40	80.96	78.44	75.38	71.06

The Mexican cotton has been introduced into Texas, as well as into Louisiana and Alabama. In the southern parts of Texas, where the climate is very congenial, the plant does not require to be renewed more frequently than once in three or four years, to yield a crop superior in quality and quantity to the annual planting of Louisiana. Cotton planting, in that part of Texas, commences in February, and picking begins at an earlier and continues for a longer period than in the other States; the average return also, to the acre, is considerably greater in Texas than in the other States, and the expense of cultivation considerably less, in consequence, not only of the greater richness of the soil, but also of the peculiar mildness of the climate. The cotton, moreover, is of a superior quality, and planters of acknowledged veracity state that it is not uncommon to pick 4,000 pounds of seed-cotton from an acre.

Mr. Featherstonhaugh, after crossing into Northern Texas, in about latitude 33° 40′, observed that he had never seen the cotton-plant growing in greater perfection before; for, in the cotton districts

he had passed through, the plant was a low dwarfy bush, not exceeding 2 feet in height; but here the plants were 5 feet high, often bearing three hundred bolls, and yielding from 1,500 to 2,500 pounds of seed-cotton to the acre, which gives from 25 to 30 per cent., in weight, of raw marketable fibre.

The most successful cultivation of cotton in the United States, it is well known, is in the lower parts of Georgia, Alabama, Mississippi, Louisiana, and Texas. In these regions, there is comparatively little frost, and the winter is always mild, with considerable heat in summer; but this is tempered, to a great extent, by the pleasant and salutary effects of the sea breeze, which sets in from the Gulf or the Atlantic for a great part of the day. There are heavy dews at night, and frequent showers occur, in the spring as well as in the summer. In the interior and more northern portions of these States, (which are in some parts elevated from 500 to 1,000 feet above the level of the sea,) frost is expected in October, and often continues until April; sometimes it occurs even in May, so as to injure, but does not then usually destroy, the plant. The heat of summer, though frequently high, still is tempered by the influence of the ocean or the Gulf of Mexico, and of the numerous great rivers, as well as by the dews and occasional showers. The cultivation of cotton is generally commenced about the beginning of April, when the land is still saturated with the winter rains, and difficulty is sometimes experienced in getting the land sufficiently dry; otherwise, a good shower is essential when cotton is first sown, and it is desirable also to have occasional showers during the planting, ploughing, and hoeing seasons. The bolls begin to open about the middle of July, and continue to do so until the appearance of frost, from the middle to the end of October.

In order to have a more precise idea of the climates of the most favorable cotton districts, and for the advantage of comparing them with those of other countries, the subjoined Table is selected from Professor Dove, as published by the British Association:—

MEAN TEMPERATURE.

LOCALITIES.	Lat. N.	Lon. W.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Mean of Year.
Galveston, Tex.	29°18'	95°10'	60.30	62.50	75.00	73.20	83.50	86.50	88.20	88.50	87.10	64.20	60.10	59.40	74.03
New Orleans, La.	29 58	90 70	56.75	58.39	66.58	72.41	77.26	81.18	82.22	82.12	79.42	69.71	58.71	52.36	69.80
Mobile, Ala.	30 12	87 59	56.40	57.37	65.64	70.00	76.36	82.17	82.41	82.73	78.94	69.97	61.50	55.50	69.92
Baton Rouge, La.	30 25	91 81	52.37	51.86	61.55	68.99	76.58	82.90	80.10	82.04	76.58	66.84	62.47	55.89	68.15
Jackson, La.	30 51	91 10	47.60	49.40	56.60	65.40	70.80	78.70	81.70	79.90	75.10	67.40	50.00	48.40	64.23
Houston, Tex.	31 54	95 56	65.20	60.50	68.70	72.70	85.50	80.10	84.20	81.40	83.50	72.30	62.30	60.00	73.00
Natchez, Miss.	31 34	91 25	50.13	50.89	62.20	69.93	72.72	80.62	81.78	80.13	74.99	64.58	55.23	49.09	66.10
Vicksburg, Miss.	32 24	91 60	51.40	53.72	63.99	74.01	76.84	80.65	82.48	80.11	76.40	64.92	55.26	50.91	67.53

To compare with these, we shall further adduce, from the same Tables, the mean temperatures of places on the Atlantic coast, as in Florida, Georgia, and Carolina, as well as in the interior of the last two:—

LOCALITIES.	Lat. N.	Lon. W.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
St. Augustine, Fla.....	29°50'	81°27'	60.73	64.97	67.55	70.06	76.69	81.41	82.81	82.67	80.16	73.63	63.55	60.93	72.13
Savannah, Ga.....	32 5	81 10	52.15	53.74	61.19	67.36	73.14	77.89	82.23	82.09	75.96	66.92	57.20	50.50	66.70
Charleston, S. C.....	32 47	79 57	49.61	52.88	58.34	63.20	75.19	78.85	80.70	80.15	74.30	66.70	58.60	51.80	65.91
Fort Johnston, C.S....	34 0	78 5	51.42	52.19	60.52	65.92	73.70	78.98	81.57	80.39	76.32	69.11	60.13	53.83	66.96
Columbia, S. C.....	34 0	80 58	37.70	42.96	47.30	62.20	67.30	72.40	76.10	76.50	66.30	53.90	43.70	39.50	57.09
Augusta, Ga.....	33 28	81 54	45.69	47.63	53.66	62.34	69.38	77.72	79.47	75.95	72.96	60.35	54.23	43.45	61.90

CLIMATE OF THE COTTON REGIONS OF THE UNITED STATES.

The climate of Georgia is somewhat warmer than that of Carolina, but the low, flat country of both, in summer and autumn, is moist, and somewhat unhealthy. The spring is commonly rainy, and the heat of summer is considerable, but is tempered by the gentle breezes, which blow almost daily from the sea. The winds change from south-east to south-west about the end of July, but are variable, from storms of thunder, and the heavy rains of July and August. The cold weather seldom commences before the beginning of December, and terminates in March, but the winter is usually mild, and snow seldom falls near the sea, and soon melts away. The hilly parts, 200 miles from the sea, are agreeable and favorable to health. The winter is colder; snow falls to a depth of 5 or 6 inches. Though the preceding tables are sufficient to give a general idea of the climates, it would be desirable, for agricultural purposes, to have also the maxima and minima for the spring, summer and autumnal months, for a series of years, as a night of frost may destroy the plants, and great heat, with drought, will be equally injurious, from drying them up. Cotton, as before observed, is sown in April; picking commences in July or August, and continues until November, and on the coast, sometimes even as late as December. The Sea Island plant yields about 125 or 130 pounds of clean ginned cotton per acre. Of the short-staple, in the hill country, from the Mississippi to the Carolinas, not more than 500 pounds of seed cotton, or 150 pounds of clean cotton, can be obtained to the acre. The short-staple cotton is more or less cultivated all the way from the southern borders of Virginia to the southwestern streams of the Mississippi. The mean quantity over all is estimated at 125 pounds of ginned cotton, of both Sea-Island and of the short-staple, to an acre, but the amount of labor is much greater for the former than for the latter.

In comparing the climates of the cotton regions above described with those of other countries, it is necessary to remember the peculiarity of that of America, with which this subject was commenced, and also how much the best cotton districts are influenced by the Atlantic, or the Mexican Gulf. The climate, to the west of the Alleghany mountains, is considered more mild than that under the same parallels in the Atlantic States, and, by some, even to the extent

of three degrees of latitude. This has been explained as caused by the warm air of the Gulf of Mexico being driven up the basin of the Mississippi and that of the Ohio. The direction of the valley, north and south, no doubt favors the course of the southern winds, while the regions of the Atlantic slopes, being transverse, oppose any such transmission, and also the migration of plants. The majority of the places of which the mean temperatures have been adduced are on the sea-coast, and necessarily participate, to some extent, in the peculiarities of an insular climate; that is, of seasons moderately contrasted. Still, the difference between the hottest and the coldest month of the year is much greater than at Vera Cruz; that is, than 12°; being, at Mobile, Galveston, and New Orleans, 27°.23, 29°.10, and 29°.96, respectively. But in the interior, at Natchez and Vicksburg, the differences are greater, being 32°.69 and 31°.57. In the Atlantic districts the differences are nearly as great as those on the south coast, being 31°.73 at Savannah, and 31°.09 at Charleston, while, in the interior, the differences are much greater, being 36°.02 at Augusta, and 38°.10 at Columbia.

In addition to the foregoing, it is desirable to notice some of the general features of the climate, both of the Gulf and of the Atlantic States, as it will then be readily seen how much it is modified by the vicinity to the sea, and by the configuration of the coast:—

Mississippi.—Near the Gulf of Mexico, the climate resembles that of the lower parts of Louisiana; the winter is mild, the summer warm, but tempered by the constant prevalence of the breeze from the Gulf, together with the elevation of the surface. At Natchez, however, the thermometer in winter sometimes stands as low as 10° F. In sickly seasons, the inhabitants frequently remove to the high banks of the bay of St. Louis.

Alabama.—In the low and southern parts of this State, the heat is very great. The climate of the inland and upper parts resembles that of Georgia, and may be considered remarkably mild. Frost commences generally in October, and continues sometimes as late as the 20th of May, so as to injure, but not destroy, the cotton, in the more elevated parts. During summer, there is usually a prevalence of westerly winds. Those from the south-east are regarded as the sure harbingers of rain. At Mobile, from nine in the morning till evening, the pleasant and salutary effects of the sea breeze are felt. The rich verdure of the earth, with the copious dews that fall during the night, and the elevation of the soil, which, in the upland parts, is from 600 to 1,000 feet above the sea, produce a beneficial effect on the climate.

Louisiana.—The climate of most parts of this State is somewhat variable. From the sea to Point Coupée, it seldom snows or freezes, except in the months of December and January, and then when the wind is from the north or north-west. There is less heat and more moisture than in similar latitudes on the Eastern Continent, and the climate is generally very mild. In winter, the thermometer seldom falls more than 2° below the freezing point. In December, 1800, the thermometer sunk to 12° near New Orleans, and snow fell for the first time in twenty years. In January, 1811, the mercury fell from

78° to 10°, and the Mississippi was completely frozen over. At the present time, (February, 1856,) it is reported as low as 20°, and the Mississippi as frozen quite over with the ice several inches in thickness, and the ground covered with ice and sleet to a depth of 6 or 8 inches.

Georgia.—All the flat country of this State is described as moist and unhealthy, during the warmer months, especially the "rice swamps;" the climate is somewhat warmer than that of South Carolina. The winter is the most pleasant season of the year, when the thermometer usually ranges from 40° to 66°, though sometimes a considerable degree of cold has prevailed; snow is uncommon, but frosts have been experienced even as late as April. A strong northeast wind will occasionally blight a promising field of cotton, as insects will sometimes destroy it. The spring is usually rainy, the summer inconstant, with a temperature of from 76° to 90° from June to September. The atmosphere feels springy and enlivening, being refreshed by gentle breezes, which blow almost daily from the sea-shore. About the 20th of July, the summer rains set in, often accompanied with storms of thunder, and severe winds, and, though not tropical in their violence, are often so heavy as to deluge the fields. About the end of July, or beginning of August, the wind usually changes its direction from southeast to southwest. The month of August is the period of most solicitude to the cotton-grower, as heavy rains at that time occasionally cause the plant to part with its young bolls, and even with its leaves. The autumn is usually fine and clear; and, about the 20th of October, frosts are expected, but do not often come before the end of the month. The inhabitants of the hilly tracts, two hundred miles from the coast, enjoy an agreeable climate, which is favorable to health. The winter is colder, snow sometimes falling to a depth of 5 or 6 inches. The summer is not so hot, and the winds of autumn are less violent; and the cotton, being less exposed, is allowed to hang longer, so as to become perfectly mature.

South Carolina.—The winter of the lower parts of this State is mild; and the difference between the mildest and severest winter is about 17°, often with heavy frosts, and sometimes snow, but with a hot sun during the day; though snow seldom falls near the sea. The winter may be considered as terminating in March, when snow and heavy rains usually occur; but April and May are commonly dry months. In the low country, the heat of summer is intense; but the climate is liable to sudden changes of temperature, when it is damp with fogs and heavy dews. June, July, and August are generally the wettest months, and the rains consist of heavy bursts and frequent showers, which are liable to occur in spring, summer, and autumn. November is usually fine, even after the coming of frosts, which sometimes do not occur until December. The average quantity of rain, for ten years, was 49.3 inches—the largest quantity 83.4, and the least 36.6, in any one year. In the upper country, frost appears earlier and continues later; but the weather is not so variable. In winter, the cold is considerable, but does not last very long. The climate of the Santee Hills, which are situated eighty or ninety miles from the coast, is similar in character.

Texas.—The climate of Texas is decidedly more healthy than that of Louisiana, or any other of the Gulf States; still, on the low alluvial coast, intermittents are prevalent during the summer and autumnal months; but the yellow fever is rarely known. Comparatively little rain falls from March to October, though gusts of wind, with thunder, frequently occur, with sufficient rain to make excellent crops. During the rest of the year, hot weather generally prevails.

The winters are warm and mild on the coast, and, for some distance inland, snow is seldom seen, except on the higher table-lands or mountains. From April to September, the thermometer, near the coast, usually ranges from 63° to 100°. The greatest heats, however, are tempered by strong and constant breezes, which begin to blow soon after the rising of the sun, and continue until past noon. The nights throughout the middle regions are cool and refreshing, during the year.

CLIMATE OF THE COTTON DISTRICTS NEAR PERNAMBUCO.

In connection with the climate of the United States, it is desirable to take some notice of that in which another species, the "Brazil" or "Kidney" cotton, is cultivated. From the observations of the late Dr. Loudon, at Pernambuco, it will be seen that the quantity of rain which falls at that place is considerable, and that the air must always be in a moist state. As Koster states that cotton succeeds better from fifty to one hundred and fifty leagues interior, the climate may still be more moist than that on the coast.

Meteorological observations, made in the year 1842, *at the city of the Recipe de Pernambuco, by* JOHN LOUDON, *M. D.*

MONTHS.	Temperature by the thermometer of Fahrenheit.			Saussure's hygrometer at mid-day.		Quantity of rain in inches.	Number of days and nights in which it rained.	
	Max'm.	Min'm.	Mean.	Max'm.	Min'm.		Days.	Nights.
January	86.00	72.00	79.59	.....	.....	6.09	20	.....
February	86.00	73.00	81.19	.....	.....	2.01	3	.....
March	87.00	72.00	81.80	.....	.....	8.23	5	20
April	84.00	73.00	78.30	.....	.....	25.24	17	19
May	83.00	71.00	78.22	.....	.....	16.21	15	21
June	82.00	70.00	76.44	.....	.....	25.26	20	20
July	82.00	67.00	75.38	.....	.....	16.11	17	19
August	81.00	69.00	75.03	96.00	75.00	3.15	7	11
September	85.00	70.00	76.33	98.00	80.00	1.04	4	6
October	87.00	70.00	81.06	99.00	70.00	1.13	2	5
November	87.00	73.00	82.93	97.50	85.00	0.29	5	.....
December	88.00	74.00	81.09	100.00	87.05	1.31	9	5
Mean	84.23	71.10	79.00	98.01	77.05	109.27	124	130

CLIMATE OF THE COTTON REGIONS ON THE PARANÁ.

The river Paraná has its source in the long range of mountains situated at the north-west of Rio de Janeiro, in latitude 21° S. Its origin, like that of most rivers, is humble, until, uniting with the Parancubá, the Tiese, the Paranapane, and the Curitabá, it directs its course to the north-west, to latitude 9° S., where, changing its direction, it turns southward till it enters the Missiones de las Guarames. From this point it begins to display its peculiar character, forming an archipelago of an infinite number of islets, and, bearing towards the west, it proceeds to unite with the river Paraguay. Until it reaches the city of Las Siete Corrientes, its waters are solely formed by the rivers running into it from the mountains of Brazil; and there it begins to receive the streams from the Andes of Peru, by its confluence with the Bermejo and Pilcomayo, which disembogue themselves into the Paraguay. Here it is that it assumes the grand and majestic appearance it retains, until, united with the Paraguay, and swollen by the waters from the mountains of the Andes, and from the ridge of hills in that neighborhood, it descends, like a fresh-water sea, towards the ocean, with which it commingles, under the name of the "Rio de la Plata."

One of the peculiarities of the Paraná, which most interests the curious observer, is the nature of its periodical inundations, very much resembling those of the Nile. In fact, it is believed that there are not two rivers on the globe, the characteristics of which are more analogous. Both have their sources in the torrid zone; and nearly equi-distant from the equator, although in different hemispheres. Both disembogue themselves almost in the same latitude, directing their courses to their respective poles. Both are navigable for many leagues, and each possesses its cataracts. Both also have their periods of increase, in the respective seasons, which cause them to inundate immense tracts; and the reason of such rising is the same in each, namely, the abundant rains, falling in torrents in the regions of the torrid zone, during the four months in which the sun is nearest to the tropics, and tending to swell the body of these waters.

The rising of the Paraná begins towards the end of December, some time after the commencement of the rainy season in the countries situated between the tropic of Capricorn and the equator, and continues, without interruption, till the month of April; when, decreasing until July, with somewhat more rapidity than it rose, it again returns to its regular level. In this month, it is usual to perceive a slight rising, which the people of the country call *el repunte*, and which is attributed to the waters the river receives from the streams pouring down from the temperate zone, where the season of winter is almost always rainy.

Although rivers, in general, which overflow their banks, are a scourge, and consequently objects of disquietude to the cultivators, destroying the fruits of their labors, and sweeping away the manure and substance of the lands, which hence remain unproductive for

years, yet, along the course of the Paraná, the contrary is the case. Its risings being periodical, they cannot surprise the vigilance of the husbandman; and, as they come on in a slow and progressive manner, rendering the land which they overflow of a better quality, so far from being injurious, they improve the soil. So gradual is the rise in its progress, that, in order to attain 12 feet, the average annual height to which the waters ascend, four months are required. Thus, the surface of the river is seen to rise as gently as a well, having its reservoirs in the interior of the earth; so that the same plants which were thriving before the inundation, reappear, when it falls, with greater luxuriance; and all vegetation, even the humblest grasses, is perceived gently to wave in the midst of the waters, when they are at their greatest height. The river then is always turbid, holding in solution a great quantity of vegetable matter, clay, and salts, which are borne along from the highlands, wherein the streams take their rise, and which the velocity of their descent does not permit them to deposit till they reach the alluvial flats, where, remaining nearly stationary for some time, over the lands and islands subject to be overflowed, they gradually deposit all the substances they contain. This is the more perceptible after the waters have retired, since the lands are then covered with a grey and viscous slime, the utility of which, for vegetable growth, is known from the prodigious increase of the pasturage, and the height and luxuriance of the trees and shrubs which clothe the previously inundated lands. It is therefore evident, that this periodical overflow of the Paraná contributes to fertilise the lands they irrigate; and that, were man to apply his hands to improve this treasure of Nature, the crops, which might be produced there, would be immense, nay, almost incalculable, especially of rice, and those species of grain which delight in moisture and fertility in a temperate clime.

Considering the extent of territory inundated by the Paraná, from its mouth to Cayasta, it waters, during the inundation, about 10,000 square miles; and, making an approximate calculation of the whole extent of the country, which receives this beneficial visitation, from near the tropic of Capricorn, (where the banks of the river begin to assume this peculiarity,) to its mouth, the space participating in so vast an advantage, without any aid from art, may be estimated at nearly 36,000 square miles.

Were this country to enjoy peace and the influences of a beneficent government, one interested in the development of the industry and the promotion of the happiness of the whole people, who could possibly calculate to what degree of perfection, and with what profitable results, cultivation might be pursued? When that epoch shall have arrived, so ardently desired by all who can feel and think, then the great Paraná, which is capable of producing all that is to be found in the torrid and temperate zones, will possess more celebrity than the Nile.

That the soil and climate of portions, if not all of this territory, are well adapted to the successful growth of cotton, is evident from the fact that the valley of Catamarca, where the temperature is of the most genial kind, and its territorial extent more than 300 miles,

produces an article, which, in the opinion of good judges, is not surpassed by any in the world. The quantity annually raised is but small, and only suffices for limited exports to other provinces, and for the weaving of the ordinary stuffs made by the women for domestic uses; but the facilities of the territory for its production are such that great crops might be grown, and a considerable export might be carried on, in that particular trade, to foreign ports, with advantages of no ordinary kind; inasmuch as, not only this cotton is of a fitting quality to compete with the best produced elsewhere, but, also, because the expenses would not be very heavy in a country where laborers can be maintained at a trifling cost, and where cultivation never need be exposed to the severity of climate in the slightest degree.

CLIMATE OF THE COTTON REGION OF THE NILE.

The soil and climate of Egypt are adapted to the growth of cotton, but the yield depends greatly on the rise of the Nile. When the river is low, the crop suffers, as little or no rain falls before December. Almost all the land in Lower Egypt is particularly well adapted to the growth of this product, yet it is not all equally good.

According to the observations of Mr. Hugh Thurburn, in one of the most airy and shady places at Alexandria, where the heat is always tempered by the sea breeze, the mean temperature in 1847, 1848, and 1849, was as indicated in the table annexed:—

May,	70°26 F.
June,	70.25
July,	78.50
August,	80.28
September,	78.13
October,	74.84

The summer temperature at Cairo is represented as fully 12° hotter than at Alexandria.

From the observations of Mr. Thurburn, during the same period as above, at Alexandria, the amount of rain which fell was as follows:—

	Inches.
Winter,	6.247
Spring,	0.278
Summer,	0.008
Autumn,	0.974
Mean,	7.507

It rains frequently in the vicinity of Alexandria, and but seldom on the Delta.

The culture of cotton in Egypt, on a large scale, is comparatively recent. It was first undertaken by M. Jumel, a Frenchman, who, in 1821, laid before the Viceroy all the advantages and results arising from its production. Previous to that period, the cotton produced in that country was of inferior quality. A few plants only had been introduced from India, and were to be found in the garden at Cairo,

where they served as ornaments. From these, the culture was extended on a grand scale, and became one of the principal branches of the agriculture of the Viceroy. Although the soil along the Nile appears to be generally well adapted to the growth of the "Jumel" or "Mako" cotton, it is planted in preference in rich, heavy lands, which retain considerable moisture, and where the plant can acquire sufficient strength to produce well-filled bolls. The grounds, where the cotton is cultivated, are kept free from the overflowing of the river, as the standing water would rot the plants, and cause them to perish. The Fellahs* take great care to protect the fields by dykes of earth, where they are subject to inundation at the time of the rise of the Nile. Nevertheless the cotton-plants are watered periodically by means of *Sakyiehs*, *Shadoufs*, or water-wheels. In winter, they water them every fifteen days; in the spring, if there is much dew, every twelve days; and, in summer, every eight days. It may here be remarked, that, in summer and autumn, the dews are very copious. The system of irrigation is admirable. The planters of some of our Southern States might profit by its adoption. In every other respect, the culture by the Fellahs is slovenly to the last degree. They begin to prepare the land for culture by flooding it in December, and allowing the water to remain upon it from ten to twenty days. No manure is employed, as the ordure of the animals of burden is used for fuel. The only fertiliser is the deposit of the sediment, of the Nile when the land is overflown. They plant in March and April in Lower Egypt, before which they usually give only one tillage to the ground, if it be rich; but, if the soil be indifferent, it is worked two or three times. In the vicinity of the Said, they everywhere plough to a depth of about 15 inches. They then run furrows at the distance of about 3½ feet. After ploughing they level the ground by breaking the clods, and it requires no further preparation. They then make holes from 3 to 4 inches in depth, and 3½ feet apart, in which they deposit from two to four seeds that have been previously steeped in water for twenty-four hours to hasten their germination. In some cases, the Fellahs cultivate vegetables, &c., in the intervals between the plants. At the time of the inundation, they eradicate the weeds. The first year, they cut the cotton-plants with a kind of pruning knife, and remove all the branches, which they use for fuel. This operation gives more strength to the plants, and protects them from cold, which would otherwise cause the branches to perish. The second year, they only work the ground when making a new weeding, and the plants, which had before ac-

*The agricultural labor of the country is performed exclusively by the Fellahs, (peasantry,) a peculiar race, who labor under a system similar to that of the serfage of Russia. The black slaves (chiefly Nubians and Abyssinians) in the country, are occupied exclusively in domestic duties, and live better and labor less than the Fellahs. The latter are not permitted to leave the premises to which they belong, and the reward of their labor is left to the will of the proprietor, and generally is the minimum of subsistence. They live in mud hovels, and are allowed to partake of animal food but once a year, and then as a religious duty. Like the Emperor of Russia, the present Viceroy has made some experiments in making the Fellahs nominal proprietors of small farms; but the exactions of the Turkish officials never leave much margin in their profits. Therefore, having but little interest in the soil they cultivate, beyond the merest subsistence, their labor is slovenly, their fields poorly tilled, and, consequently, improvements cannot well be introduced.

quired a growth of from 3½ to 5 feet in height, the first year, now grow only in a less degree.

The cotton begins to flower early in July, and continues to bloom till December, and even into February or March. The period of harvesting varies in different districts. The first year, it commences in July and ends in January, when the season is not too cold. The product of each plant is 1¼ pounds in the rough; the second and third years, from 1¼ to 2 pounds; but, in the subsequent years, the plants lose their fecundity, and it has been found necessary to renew them every three, and, in some instances, every two years. They would produce bolls, however, for a long period—say fifty years. At the expiration of three years, the plant increases in its shrubby character, producing a very thick foliage, with but few bolls.

The yield of cotton varies according to the circumstances under which it is cultivated. That which is sown in winter, called *Baaly*, and which is watered only during the inundation of the Nile, gives, on an average, above 200 pounds to the acre. That watered by means of wheels, and called *Miskawi*, gives about 300 pounds to the acre. The maximum yield has been as high as 700 pounds; but such instances are rare.

CLIMATE OF THE COTTON REGIONS OF ALGERIA.

The soil of Algeria is generally well adapted to the cultivation of cotton; but the climate is quite the reverse, from the deficiency of rain, the very light dews, the extreme heat of summer, and the almost incessant rains in autumn. Nor is the whole of Algeria suited to the growth of cotton—it is necessary to select those parts which are the most propitious. On the chain of the Atlas, as well as on the plains which crown its heights, the heat, although in summer excessive, does not continue long enough in autumn to permit the complete maturity of the bolls. In the region of Tell, it becomes necessary to abandon its culture, at an elevation of 2,000, or even 1,600 feet, above the level of the sea. But, beyond this central and mountainous country, there extend two zones, which are declared suitable for the growth of cotton, and it is said that proof has been given to that effect; one is the region of the coast from La Calle to Nemours—the other, that of the Saharian oasis. Another obstacle to its culture is, that cotton, in general, cannot be planted, before the middle of April, without running the risk of the seeds perishing from the excessive moisture of the land. Consequently, it cannot arrive at maturity before the prolonged rains of autumn commence, which nearly stop its growth.

The province of Oran is reputed to be better adapted to the growth of cotton than the other two, Algiers and Constantine.

Algeria, situated, as it is, between the 34th and 37th degrees of north latitude, bounded on one side by the Mediterranean, and, on the other, by the desert of Sahara, from which it is separated by mountains, possesses a climate, in most parts, similar to the zones bordering on the tropics. It is not, however, strictly a tropical,

neither can it be said to be a temperate region. It is particularly remarkable for the uniformity of its temperature throughout the year.

The following table shows the maximum, minimum, and mean annual temperature at Algiers, Oran, and Bône, for four years, taken at mid-day:—

Places.	Years.	Maximum.	Minimum.	Mean.
Algiers.	1837	88° F.	50° F.	71° F.
	1838	88	59	72
	1839	91	50	73
	1841	90	50	72
Oran.....	1841	84	42	62
Bône.....	1841	95	43	71

This equality of temperature is quite as apparent from the mean of each of the four seasons. Thus, at Algiers, during the four years above mentioned, the mean temperature of the three winter months was 64° F.; the three spring months, 67°; that of the summer months, 80°; and that of autumn 73°.

The mean temperature of Bône, for the year 1841, was, for the winter, 57° F.; for spring, 67°.5; for summer, 84°; and for autumn, 73°.

At Oran, they have a mean winter temperature of 52°; spring, 60°; summer, 72°; and autumn, 63°.

The mean temperature of the seasons, for the year 1838, at Algiers and Constantine, fully corroborates the equableness of the climate of Algeria, as indicated in the annexed table:—

Seasons.	Mean at Algiers.	Mean at Constantine.
Winter...	66° F.	50° F.
Spring....	69.	24.
Summer..	75.	79.
Autumn..	75.	66.5.

It may be remarked, that the transitions of temperature, in this climate, are very rapid, the changes of wind sudden, and their effects upon the weather immediate.

In regard to the amount of rain which falls in Algeria, it cannot be well ascertained, from the limited number of observations that have been made. The mean number of days, for four years, in which there was rain in April, was five; in May, two days; in June, one day; in September, two days; in October, six days; but, in July and August, only a fraction of a day.

In 1840, a remarkably dry year, there fell, in April, 1.65 inches; in May, 0.67 inches; in June, 1.02 inches; in July, 0.08 inches; in August, none; and in September, 1.5 inches.

Oran, which is situated in an arid country, is much drier than Algiers. But Bône, on the contrary, situated near the woody mountains of Edough, at the entrance of the fertile plains of Seybouse, possesses a greater degree of moisture in the atmosphere.

The mean amount of rain, which fell at Algiers from 1839 to 1841, inclusive, was 22.95 inches; at Oran, in 1841, 13.54 inches; at Cherchell, the same year, 26.34 inches; and at Bône, also the same year, 16.06 inches.

The monthly amount of rain, in inches and parts, which fell at Constantine, in the year 1838, was as follows: January, 0.71; February, 1.93; March, 8.31; April, 5.83; May, 0.08; June, 1.77; July, 2.91; August, 0.51; September, 0.71; October, 2.2; November, 6.54; December, 16.06. Total, 47.56 inches.

From the preceding observations, it will be perceived that more rain falls in the mountainous districts than on the coast; that it is nearly equally divided among the seasons of the year; and, in fact, they have almost a climate of summer rains.

The amount of rain, in inches and parts, which fell at Algiers, during the last cotton-growing season—that is, between the 1st of April, 1855, and January 31st, 1856, inclusive, was as follows: In April, 3.92; May, 1.29; June, 1.8; July, none; August, none; September, 0.008; October, 3.18; November, 2.24; December, 5.55; January, 1.05. Total, in ten months, 19.038 inches.

It may be here remarked, that there has been much less rain at Algiers, during the last fall and winter, than has been known for a number of years, many of the cisterns having failed, and caused great anxiety among the inhabitants.

In the cultivation of cotton, in Algeria, stable-dung is sometimes used, though but few farmers pay any attention to their fields. As their cattle are never housed, their means of making manure become very limited. They plant from the 15th of April till the 10th of May, in rows, about 2 feet apart. The crop is hoed four times, and irrigated as often as water can be spared from other plants; and, when abundant, it is applied every four days. The bolls begin to form in July, and the plants continue in flower from September until the latter part of February. The harvesting also commences in September, and lasts until the following spring.

CLIMATE OF THE COTTON DISTRICTS OF OTHER PARTS OF AFRICA.

Cotton of a very good quality has been cultivated, for some years, at Natal, nearly at the southern extremity of Africa. The coast is low along that region, and, in some parts, even swampy; but the land, within ten miles of the sea, is considered most favorable to the cultivation of cotton, probably from the constant moisture of the atmosphere, and the warmth of the climate; though, no doubt, it may be successfully grown further in the interior. The country beyond is described as being better adapted to the purposes of grazing.

Various attempts have been made to obtain cotton from the west coast of Africa, and the seed of the best varieties have been introduced from the United States. In Liberia, Dahomey, and other places, fine samples have been produced, principally from the Green-seeded and Kidney-seeded sorts. The climate is represented as favorable, but a different population is required for an extended and profitable production.

CLIMATE OF THE COTTON REGIONS AND ISLANDS OF THE MEDITERRANEAN.

Considerable quantities of cotton are cultivated in other countries bordering on the Mediterranean. It is generally the product of the Indian species, though seeds have been introduced from Egypt and the United States. These are cultivated in Asia Minor, in parts of Greece, and the islands generally known as the Levant. The Italian cottons are produced in Sicily, in Calabria, near Naples, and in Malta. Those of Sicily, Calabria, and Castellamare are the best, and are usually produced from American seed. A Nankin cotton is cultivated in Malta, but is all manufactured for domestic use.

At Naples, the soil and climate are well suited to the growth of cotton, with the aid of artificial irrigation in times of drought. In some seasons, however, the plants receive injury from insects, as well as from fogs and mists, in July and August. The maximum, minimum, and mean temperature, in the sun, near Naples, is as follows:—

	Max.	Min.	Mean.
May, . . .	80° F.	75° F.	77°.5 F.
June, . . .	100	80	90
July, . . .	112	100	106
August, . . .	112	100	106

As little or no rain falls in these months, recourse necessarily has to be had to artificial irrigation.

The manure, when employed, is the dung of animals, but no other fertiliser is used. The seed is planted in April, in rows, with sufficient space between them for the passage of water, for the purposes of irrigation. The plants are in flower in June and July; the cotton harvested from September to November; and the yield per acre, unginned, besides other crops between the rows, 600 pounds.

The soil and climate of Sicily are better adapted to the growth of cotton than those of Naples, particularly on the southeast side of the island, and within twenty miles of the sea. Further inland, the heat is not sufficient to mature the crop. The maximum temperature of the cotton regions, from May till October, is 77° F.; minimum, 61¼°; the mean 68°. The quantity of rain which falls during the cotton-growing months is generally fully sufficient for the perfection of the plant. The principal injury to the crop is occasioned by long-continued north winds, which, however, but seldom occur.

CLIMATE OF THE COTTON DISTRICTS OF BRITISH INDIA.

In the Peninsula of India, the climate is greatly influenced by the two monsoons—one from the north-east, which blows chiefly on the eastern coast, and the other, from the south-west, which is mostly felt, in Malabar and the western parts of the country. In some parts, the advantages of both monsoons are enjoyed; but, in others, the change from the moisture of the rains to the heat and dryness which succeed them, is nearly as marked in its character as at Saharunpore, and the cotton-plants suffer as much from the transition. Such being the extremes of temperature and of dryness, as well as the shortness of the several seasons in which the plant may be made to grow—that is, during the hot and dry weather, from March to June, or during the steaming moisture of the rainy season, followed, at first, by a hot and moist summer, and then by a cold and dry autumn, succeeded by a bracing winter—a plant must be hardy to sustain uninjured such extreme and sudden vicissitudes. But all India is not identical in climate. In some, parts the accession of the rains is earlier, their termination more gradual, and the cold of winter less, or the country enjoys the advantages of a double monsoon; so that there is a longer period of growth.

Temperature, as we have seen, is only one of the elements of climate, and, though a very important one, is yet unable of itself to do anything towards the growth of a plant, unless water be within the reach of its roots to dissolve and carry into the vegetable cells and vessels the elements of nutrition. It must be decomposed, in contact with air, not too dry, nor yet too damp, but containing its due proportion of oxygen and carbonic acid gas, and illuminated by the light of the sun. There is no doubt that cotton-plants may exist through a long range of temperature, and of moisture and dryness of the atmosphere; but it is equally certain that they will never attain healthy vigor of growth unless there is a due supply of moisture in a moderately warm, or rather hot atmosphere. Though the degree of heat may be measured with a thermometer, moisture is not always indicated by the rain-gauge, for rain may fall, and run off the surface, or percolate the soil, and the earth and the atmosphere both be left in a parched state, even during the season of growth. The moisture can only be determined by the hygrometer, or the wet and dry-bulbed thermometer; and, imperfect as the majority of such instruments are, the information obtained from many situations would be invaluable, as we might then be more sure of drawing correct inferences, because, though we might not be able to calculate correctly the exact quantity of moisture contained in the atmosphere, we could see whether this was in a state of saturation, or was capable of taking up a still larger quantity, and thus in the one case checking, and in the other favoring, evaporation from the soil, and from the surface of plants. To the comparative moisture of the air, on the sea-coast, and in places within the reach of the moist sea air, must chiefly be ascribed the preference of the cotton-plant for such situations, or, at least, for its successful culture in so many islands, and along so many

coasts. But to this it may be objected, that a long-stapled cotton is successfully grown in the dry climate of Egypt. In that country, however, copious irrigation produces the same beneficial effects in a warm, dry atmosphere. Excess of moisture in a warm climate, however, may prove as injurious as its deficiency; for then the parts of vegetation may be altogether stimulated, or may be in a state of continual growth, when plenty of branches and leaves are produced, but few flowers and very little cotton.

The seasons of India, over a great part of the country, are divided into the cold, the hot, and the rainy-names which sufficiently indicate the particular characteristics of each. If we take an equatorial climate, like that of Sincapore, as a standard of comparison, we shall observe a very great difference between it and that of a northwestern situation in the plains, such as Saharunpore, in 30° of north latitude, the first being remarkable for uniformity, and the latter for a great range, both of the dry and wet-bulbed thermometer. Plants, which live throughout the year in the open air at Sincapore, will, in most cases, suffer, both from the cold and the heat of Saharunpore, though they may flourish in the rainy season almost as well in the one as the other.

D. J. B.

Mean temperature in the shade, by Fahrenheit's scale, of several localities in India, where cotton has been cultivated.

LOCALITIES.	N.Lat.	E.Lon.	Height above sea.	January.	February.	March.	April.	May.	June.	July.	August.	Septemb.	October.	Novemb.	Decemb.	Year.
Sincapore	1°23'	103°52'	sea level.	86.00	86.00	89.00	85.00	85.00	87.00	88.00	86.00	87.00	87.00	86.00	85.00	86.58
Madras.....	13 4	80 14	sea level.	75.50	77.70	80.80	83.70	86.80	87.70	85.30	84.60	83.70	82.02	78.90	76.30	81.91
Calcutta.....	22 23	88 28	sea level.	66.20	69.80	80.00	85.40	85.70	83.70	81.80	82.00	82.00	79.20	74.20	66.60	78.05
Benares.....	25 18	82 56	300 ft.	62.56	72.49	79.07	89.91	94.35	90.28	85.71	85.72	85.99	81.49	72.13	63.45	80.26
Cawnpore	26 29	80 22	500 ft.	63.08	69.05	79.15	88.55	96.05	91.23	86.65	87.04	85.03	78.95	73.25	67.05	80.01
Surouli.....	28 41	77 13	800 ft.	51.43	59.29	67.23	75.03	82.53	87.75	88.61	88.90	77.83	72.32	60.26	49.35	71.71
Saharunpore ..	29 57	77 32	1,000 ft.	52.05	63.25	68.00	79.00	86.05	89.00	86.75	85.25	78.00	74.00	64.75	56.05	73.51
Deyrah Doon	30 15	78 5	2,350 ft.	52.08	59.05	67.00	73.00	81.00	86.00	83.00	81.00	78.05	73.05	57.00	56.05	70.52

Average quantity of rain, in inches and parts, on the sites of experiments in the culture of cotton, on the low lands of the coast, and on the table-land of the Deccan, in India.

SITES.	N. Lat.	E. Lon.	Height above sea.	January.	February.	March.	April.	May.	June.	July.	August.	Septemb.	October.	Novemb.	Decemb.	Year. Inches
Madras.....	13° 4'	80°14'	sea level.	1.33	0.23	0.36	0.63	1.03	2.03	3.20	5.24	4.76	10.09	12.43	3.25	37.20
Bombay.....	18 56	72 53	sea level.	Konkun, sea coast.....												68.75
Butnagherry....	.....	.....	150 ft.	" " "												114.55
Tanna.....	19 09	73 00	sea level.	" inland.....												105.16
Dapoolee.....	.....	.....	300 ft.	" "												134.96
Kundaillah.....	.....	.....	1,540 "	Western Ghats.....												141.30
Mahabuleshwur.	17 56	73 30	4,500 "	" "												254.84
Paunchgunnee.	.....	.....	4,000 "	" " east branch.....												50.69
Sattarah.....	17 10	73 12	2,220 "	Deccan, table-land.....												39.30
Colapoor.....	16 20	73 10	.....	" "												30.74
Poonah.....	18 00	73 00	1,842 "	" "												19.09
Nassuck	19 56	73 56	.....	" "												26.79
Belgaum	16 07	75 00	2,000 "	" "												40.90
Dharwar	15 28	75 8	.....	" "												28.81
Ahmednugger ..	19 10	73 15	1,900 "	" "												21.83
Shorapore	.....	.....	.....	" "												32.16

PROTECTION AGAINST THE DANGERS OF LIGHTNING.

[Condensed from the American Almanac of 1856; from the pen of Professor Joseph Lovering, of Harvard University.]

Among the means which human ignorance or science has adopted in seeking protection against the dangers, great or small, real or imaginary, as the case may be, of the lightning's stroke, it may be mentioned that the Romans had an idea that seal-skins were a defence against this celestial weapon. Tents were made of them, and Suetonius informs us that Augustus always kept one on hand. Some will trace back to this prejudice the custom which prevailed to a late day in Cevenses, a Roman colony, of wearing the cast skin of a serpent around the hat. According to Koempfer, the emperors of Japan not only took refuge, like Augustus, in a cave, but placed a reservoir of water above the cave, thinking the lightning would be extinguished by its passage through the water. If this were the case, fishes, it would seem, must be safe. But it appears, on the contrary, that when, in 1670, the lightning struck the lake of Zirknitz, twenty-eight full wagon-loads of fish were collected from the surface of the water, for manure. In 1772, at Besançon, the water was covered with stunned fish. During a thunder-storm, the Jews open the windows, that their Messiah may come in. Salverto relates that, in Russia, the windows are shut, and all the cracks stuffed, from fear of leaving an entrance to the evil spirit whom God is pursuing in the storm. By others, three blows with a thunder-stone were believed to consecrate a building against lightning.

The question has been raised, whether the danger from lightning is increased by running, or even walking, especially against the wind. Some argue that motion, especially if it is rapid, leaves a vacuum behind the body, which invites the lightning; also, that it promotes evaporation. Instances have been adduced to prove that a lateral discharge, from a conductor of electricity, is promoted by the diminished pressure of the air which a wind produces. Others oppose to this danger that of exposure to the rain, if you do not run. Nollet thought that wet clothing exposed the person who wore it to the lightning itself. But this was not Franklin's opinion. He was unable to hurt a wet rat by making it the discharger to a Leyden battery, though he could easily kill a dry rat. The moist surface carried the charge, and saved what was beneath it from violence. Nevertheless, animals wholly plunged in water have been killed, as if the saline liquids in their bodies conducted better than the water itself. Some stress is laid upon the quality of the clothing on the body; for it is said that once, of three priests, the one who was clad in silk was singled out to to be saved, while the other two were killed. Balitoro and other meteorologists affirm that lightning never strikes a building on the northern side. Hence, in Italy, the inhabitants crowd to the northern end of their houses, in thunder-storms. Arago thinks we have an ample explanation, of whatever in this statement

requires any, in the fact that the thunder-storms of that country come from the south; so that, if they strike without waiting to be vertically over the fatal spot, they must attack the southern side. Hammocks suspended by silken cords have been sought as an asylum. There may be a slight advantage in a horizontal position, especially upon the bed. But more than one case can be adduced, from Howard and other meteorologists, to prove that this circumstance gives no certain protection, and for this reason, with others, that the charge may come horizontally. Cages of glass have been made for the very timid; and some would advise to sit upon a decanter turned bottom upwards, and to make a footstool of two tumblers. A building of glass will not exclude the lightning; for conservatories have been struck, and eight hundred panes of glass destroyed, and the frames left; and not always by the jar, for sometimes fine punctures, such as electricity alone can produce, are found in the glass. Metal about the person, or the house, modifies, no doubt, the effect of the lightning, when it strikes. But it is too much to say that it determines the stroke; except, perhaps, when a broken line of metallic bodies forms a partial chain of conductors from the roof to the earth. In 1819, twenty persons were together, and the one with a chain around his waist was struck. Steel corsets, ear-rings, finger-rings, bracelets, knives, forks, chains, pencils,—each, it is thought, adds to the hazard. This is one objection also to a metallic currency. Some are so scrupulous as to shun iron nails in their shoes. Brydone recommends that ladies should carry small chains, or a fine wire, which they can suspend from their bonnets, or other out-works, in time of danger, as the ship displays in the storm her lightning-chain. But we may fairly inquire whether the presence of small quantities of metal about the person may not, by taking the charge, if the lightning should strike the individual, be of as much service as they threaten to do injury by provoking a stroke which otherwise would not come; for it is well known that, in one case, a bonnet, with an iron frame, vanished into thin air without any personal injury. Kundman mentions the fact, that a pin in the hair was melted, when the hair was not singed, and the wearer escaped, as it were, by the hair of the head.

More importance must be attached to the larger masses of metal, which belong to the structure or furniture of a building, than to those small portions which are worn in the dress. Nails, picture-frames, chandeliers, and, especially, bell-wires, water-pipes, gas-pipes, the clamps used in masonry, the spindles of weather-cocks, which by their length and other dimensions admit of comparison with lightning rods, may increase the danger, as well as affect the character of the stroke, when it comes. Nollet affirms that steeples of slate are are struck oftener than those of stone, on account of the nails, but perhaps rather by reason of the moisture absorbed. Because females and children enjoy greater impunity than men, it is thought to be safer in-doors than abroad. If it is safer in cities, where there are so many spires to neutralise the clouds, than in the open country, still there may be more danger in a crowd than out of it; not only because it is a mass of conducting matter, but also on account of the

vapor which rises from it, which adds to the conducting power of the air. For this reason, flocks of sheep and herds of cattle are in danger. Barns and granaries exhale vapors, and are often struck. When lightning falls among a crowd, it appears, sometimes, to seek out some individuals and to shun others. Often this may have been the result of peculiarity of position, which was not known, or is not remembered. Color also has some influence. Three cases are described in which horses or oxen had all their white hair singed and burnt off, while the rest was left. It is well known that all persons do not conduct artificial electricity equally well, and that a few, if made parts of the line of discharge, arrest it. The soot of chimneys is a good conductor. The middle of a street is thought to be safer than the side-walk.

Nor is the greatest danger in a cloud. Volta called the idea of traversing a thunder-cloud fool-hardy. If the thunder strike with such destruction at a distance, what will it do near? In spite of this argument, the engineers on the Pyrenees, and other parties, have passed safely through a storm, having it first above and then below them. While making the critical passage, their hair and the strings to their caps stood on end, and a buzzing noise was heard. The sister of Arago passed through a storm-cloud. The parties shut their eyes, stopped their ears, and, in a quarter of an hour, they were above the awful scene. Peytier and Hossard traversed thunder-clouds with the same security, though their companions, who were below, never expected to see them again.

Arago recalls the fact, that noise has always been used as a panacea against every kind of evil, real or imaginary, as eclipses, comets, and locusts. Mariners have the notion that the noise of cannon dissipates clouds. Conte d'Estree routed a West Indian hurricane in this way. Arago finds that faith in noise, for this purpose, has been common in Europe since 1765; and that it has been tried in the fields against hail. In some places, from nine to twelve hundred pounds of powder have been consumed yearly, being fired in high places. But, he objects to its utility that ships are struck by lightning when cannonading; that storms have broken out during dreadful bombardments and explosions, and that the usual number of stormy days is found at forts where artillery practise constantly. In 1718, Des Landes informed the French Academy that, on the 14th of April, twenty-four churches were struck in Bretagne, in all of which the bells were ringing, while others, in which the bells were silent, escaped. Notwithstanding this statement of a single case, we may doubt, with Arago, whether the acoustic disturbance of the air increases the danger of being struck by lightning; though it may be very true that, when churches are struck, those who have hold of the ropes are eminently exposed to the charge. The reputation of the bells for preventing the strokes of lightning did not suffer by the disasters of the 18th of April. It was argued that the catastrophe occurred on Good Friday, and that no bells ought to be rung on that day. As Franklin says, "still they continue to bless the new bells, and jingle the old ones, whenever it thunders." The government, however, interposed at last, in some places, and forbade the ringing. In Romagna,

heaps of straw and other light combustibles are prepared in the field, and lighted, on the appearance of a storm, to disperse it. Arago does not think the practice of three years conclusive, and compares the agricultural districts of England with the mining regions, abounding in furnaces. He finds fewer storms in the latter, but he doubts whether the cause must not be sought in the mineral character of the soil, more than in the heat or the smoke of the conflagration.

I now come to the lightning-rod, by general consent the invention of Franklin. There are those who tell us that, if he did not conscientiously appropriate the knowledge of others, he was in fact anticipated, perhaps by thousands of years, because Herodotus says that the "Thracians shot arrows into the air to threaten" the thunder. Dutens pretends to trace back the invention to that ancient date. The Hyperboreans disarmed the thunder-cloud, as they thought, by launching upon it their darts, armed with iron points. Pliny says that the Etruscans, renowned in antiquity for their knowledge on this subject, were able to direct the lightning. Among the Romans, Numa had some control over it, but Tullius Hostilius made the attempt, and was killed for his audacity. There is a story about a medal of Augustus whereon appears a temple supplied with many pointed stakes, which some would have us to suppose are so many lightning-rods. Another story tells of a different medal, on which is seen the Jupiter of the ancients, cloud-compelling and the thunderer, soaring in a cloud, while an Etruscan is below flying a paper kite. Artaxerxes believed that two swords, planted in the ground, dispersed the clouds. In the time of Charlemagne poles were used for the same purpose, but, unfortunately for the antiquarian, they were not supposed to have any efficacy till bits of magical paper were stuck to them. In the fifteenth century, a naked sword was put upon the mast-head to disenchant the storm. On the banks of the Adriatic, near one of the bastions of the castle of Duino, there has stood from time immemorial an iron rod, in a vertical position. The soldier who mounted guard was in the habit of presenting an iron halbert to it, when the weather was cloudy; and, whenever he perceived that the iron afforded sparks, he rang a bell to give notice to the countrymen in the fields, and to the fishermen, that stormy weather was approaching. This was as far back as 1602. Something like a rod was mentioned, in an old manuscript, as in use in 1610.

In the discharge of atmospherical electricity, it is possible, perhaps, to recognise all the varieties which Faraday has made out for artificial electricity. By convection and conduction, by the rain, the snow, the moist air, and also by those natural and eternal lightning-rods which stand erect upon the earth, such as the mountain pinnacles or the forests, the charge, which accumulates in the upper regions of the air, is silently drawn, or is otherwise brought down, to the earth. Mr. Arrowsmith saw no houses in Yucatan which had been struck by lightning. The palm-tree has the credit of protecting them. Tristan studied sixty-four storms, which raged in France between the years 1811 and 1837, and he noticed the fact that, whenever one passed over a forest, it was disarmed and shorn of its dangerous power. In cutting trees, very many are found to have

been struck. Captain Dibblin, in writing of Virginia, in 1763, tells us that, when oaks and pines are growing together, the oaks are struck, although the pines are the taller. Some have supposed that certain kinds of trees were lightning-proof, but not in the sense in which Tiberius understood the property. He wore a crown of laurels to ward off the thunder-bolt. Tarchon surrounded his dwelling with white vines. Laborers in Europe, whenever they see branches of the vine dried up, ascribe the decay to lightning. In 1787, Mr. H. Maxwell published a paper on this subject, in which it is said that the beech, birch, and maple are safe, or, according to some, all resinous trees; but Arago has found instances to show that all kinds of trees may be struck, when standing alone. No one can doubt the reality of the mighty influence which a forest, or even a single large tree with its outstretched arms, may exert upon the electrical state of the neighborhood, if he reflects upon the experiments of Mr. Pine, which prove the great superiority of pointed leaflets to metallic points. If a spear of fresh grass is brought towards the charged prime conductor of an electrical machine, it begins to glow at the distance of 14 feet, although a metallic point would show no light farther off than 3 or 4 feet. Mr. Pine also discharged a large Leyden jar through the body, by holding a blade of grass in each hand. With these vegetable points he was able to discharge it in 4 minutes and 6 seconds, while fine sewing-needles could only do it in 11 minutes and 18 seconds. Moreover, a gold-leaf electroscope was troubled by a jar at the distance of 7 feet, if its cap was pointed with the branch of a shrub, as the butcher's broom, whereas, metallic points required that the distance should be reduced to 2 feet, to betray any electrical sensibility. Clouds, too, passing over the instrument, disturbed it in the first case, and not in the second. What, then, must be the accumulated agency of a forest, assisted by the thousand thorns, twigs, and buds, and the million spiculæ upon the rye and barley? It is no serious objection to the foregoing remarks, that trees, and bodies near them, are sometimes struck and damaged. In Conway, Massachusetts, a house was struck, in 1816, although surrounded by trees. Perfect exemption from lightning cannot be claimed, even in the neighborhood of a good lightning-rod; and a tree may add to the danger, instead of lessening it, for one who stands too near the trunk, or under the overhanging branches, since the roots of a tree are not good conductors.

I shall now make some remarks on the manner of constructing the lightning-rod, though it would be impossible to exhaust this subject in any narrow limits. First, in respect to the material of the rod, —which metal is the best? Iron is strong, and can resist mechanical violence, but it rusts, and the oxide formed is a poor conductor. Brass grows brittle, and copper, therefore, though expensive, being durable and a good conductor, is preferred. Secondly, in considering the *form* of the rod, I do not lay much stress upon the shape of the cross section. The square figure with its edges may have some advantage over the circular section; but I am not certain that as much is not lost, by the facility afforded for a lateral discharge at a dangerous point, as is gained by relieving the rod of a part of its charge all along the four edges. These edges are also relied upon to discharge

the cloud quietly, as the points at the top of the rod discharge it; and, for this purpose, the rod is twisted, so that its edge may be presented to all points of the horizon. The twisting slightly injures the conducting power of the rod, and cannot be needed for the object in view, as the lightning is not tied down to a geometrical straight line for its orbit. The only important question which has ever been raised concerning the shape of the rod is an old one, and it was soon put to rest. In 1764, Nollet, a rival of Franklin, encouraged the idea that the points which the American discoverer recommended for the top of the lightning-rod, provoked the attack of the clouds. In England, George the III. had parasites about him, who flattered the political prejudices of that king, and advocated blunt rods, because Franklin insisted on points. Mr. Wilson, a member of the Royal Society, published a paper in opposition to the points, alleging that they invited the electrical fluid in the clouds. Nairne, well versed in electrical experiments, wrote upon Franklin's side. The far-sighted efficiency of the pointed rod, in disabling the clouds, while yet a great way off, was proved by Beccaria's experiment on an interrupted rod. The sparks at the break betrayed the passing electricity. With a break of one-eighth, or one-tenth of an inch, a constant succession of sparks will be seen during a storm. Captain Wynne, on one occasion, found them to continue at an accidental fracture in a rod, for 2½ hours. The destruction, by lightning, in 1769, of the powder magazine at Brescia, awakened the attention of the British government to the safety of their own magazines, at Purfleet. At the request of the Board of Ordnance, Dr. Franklin visited Purfleet, and recommended the use of pointed lightning-rods, such as had been used with success in America for twenty years. But Mr. Wilson, "then of some note as an electrician," advised the adoption of blunt conductors. On account of this difference of opinion, the Royal Society was consulted, and, in 1772, a committee, consisting of Cavendish, Watson, Franklin, Wilson, and Robertson, men eminent in electrical science, was appointed to suggest the best means for protecting these powder-magazines. The committee adopted Franklin's views in regard to the superiority of pointed over blunt conductors, and the report, drawn up by Franklin himself, was signed by all the members, except Mr. Wilson. The objection of Mr. Wilson to the pointed rod was the same as that of Nollet; namely, that the point invited and increased the lightning. "Every point, as such, I consider as soliciting the lightning, and, by that means, not only contributing to increase the quantity of every actual discharge, but also frequently occasioning a discharge where it might not otherwise have happened." But Franklin refuted this position of his opponent, in the paper which he read to the committee, entitled "Experiments, Observations, and Facts tending to support the Opinion of the Utility of long pointed Rods for securing Buildings from damage by Strokes of Lightning." Unfortunately, the magazine at Purfleet, which was provided with pointed rods, according to Franklin's advice, was struck by lightning in 1772, though without suffering any damage. This revived the controversy between Franklin and Wilson, in regard to pointed and blunt conductors, in which the court sided with Wilson, for it

was now 1777 and not 1772, and the battle of Bunker Hill, in the mean time had been fought. At the instigation of parties hostile to Franklin, and flatterers of the king, the pointed conductors were removed from the queen's palace, and blunt ones substituted. But Franklin's fame was not disturbed thereby, neither was Franklin himself. When he heard of Dr. Ingenhousz's indignation at the change, he said: "He seems as much heated about this one point as the Jansenists and Molinists were about the five." Franklin then added the following noble sentiments, worthy to be placed by the side of Kepler's enthusiastic challenge to mankind, upon the discovery of his three celebrated laws: "I have never entered into any controversy in defence of my philosophical opinions; I leave them to take their chance in the world. If they are right, truth and experience will support them; if wrong, they ought to be refuted and rejected. Disputes are apt to sour one's temper and disturb one's quiet. I have no private interest in the reception of my inventions by the world, having never made, nor proposed to make, the least profit by any of them. The king's changing his pointed conductors for blunt ones is, therefore, a matter of small importance to me. If I had a wish about it, it would be, that he had rejected them altogether as ineffectual; for it is only since he thought himself and family safe from the thunders of heaven, that he dared to use his own thunder in destroying his innocent subjects." A subscription was raised at court to enable Wilson to make some experiments in the Pantheon, favorable to knobs. But Henly, Nairne, and Lord Mahon, men of weight in electrical science, exposed the fallacy of Wilson's arguments. The Privy Council applied to the Royal Society to investigate the subject again. It was referred to a new committee, and this committee endorsed the conclusions of the earlier committee. The Royal Society was urged to change their report, but they steadily rejected any interference with their scientific privileges, the President, Sir John Pringle, declaring that "he could not change the laws of Nature."

In France, the lightning-rod sends up one solitary aspiring point to disenchant the thunder-cloud. But in Germany, England, and America, it is a common practice to surround the principal vertical point with a cluster of subordinate and inclined points, which stand ready to charge with fixed bayonet upon the hostile electricity of the sky, from whatever quarter it may threaten an attack. The multiple points may also serve to make up, by their number, for the imperfection of any one, an imperfection which may arise from its oxidation by air, or its fusion by lightning. The imperfections from these causes have not been overlooked. The iron point has been gilded, or, better still, a gilded point of copper has been used. In 1790, Robert Patterson, of Philadelphia, proposed to make the points of plumbago, on account of its ability to resist fusion. But the improvements which Wollasten introduced into the mode of purifying platinum, and rendering it malleable, have rendered the great resistance of that metal to the influence of the air, or of heat, available in the selection of a proper material with which to point the lightning-rod. Too much, however, cannot be said in disparagement of points, however patented, made, not of platinum, but of a platinum needle sunk into

another metal so soft, that it can be melted down in the flame of a candle. The plan, adopted by some, of pointing a rod with a magnetised needle, rests upon no scientific basis whatever. The question is often asked, whether electricity exhibits signs of inertia, or shows any tendency to leave a circuitous path, and dash off in a tangent. The common impression, with scientific and practical men, is, that electricity moves without any perceptible inertia. Hence, in the construction of lightning-rods, but little care has been taken to avoid short turns and sharp angles in the longitudinal shape of the conductor. But the attention of both cannot fail to be arrested by the facts to the contrary cited by Arago, in his posthumous work, "Le Tonnerre."

The efficiency of a lightning-rod depends upon its height above surrounding objects. This is proved by experiment. Several rods of unequal height are placed near each other, and it is observed that the highest carries down the largest amount of electricity, this amount being measured for each rod by the number of sparks which can be counted, in a given time, at a break made for that purpose in the rod. An experiment with artificial electricity would be equally instructive. Under the same circumstances, the most elevated object will be chosen, as the principal conductor, by the lightning. Therefore, the rod must rise higher than the objects which it is designed to protect.

It is of much importance to know the necessary height of a rod above these objects, or, in other words, to know the horizontal area which is protected by a rod of a given height. Franklin did not give attention to this inquiry. In England, rods rose 10 feet above the roof; in France, they mounted sometimes to 30 feet. In 1788, J. B. Leroy, "guided by vague analogies," gave the rule that the space protected was a circle of 16 metres in radius, when the height of the rod was 5 metres above the building. In 1823, the Physical Section of the French Institute was consulted on this subject, by the Minister of War, and adopted, as its own, the opinion of Charles, that a lightning rod protects, at its point of contact with the top of the building, a circular space around, the radius of which is double the height of the rod above that point. This rule has been generally adopted since that time, though it is not known upon what grounds Charles established it. In extending this rule to different levels, above and below the point of contact of the rod with the highest point of the building, we might suppose that so large a circle could not possibly be protected on the higher levels, while a still larger one might be protected on the lower levels. And thus we might reach the generalisation, that the whole space protected, from the top of the rod down to the ground, would be included in a cone, the radius of whose base was twice its altitude. By referring to the case of a tree struck at Cambridge, Massachusetts, as described by Dr. Winthrop, and other instances, Arago has concluded, that bodies are not exempt from danger within this cone; while there is no instance to overthrow the supposition of a protected cylinder of space, having the uniform radius which Charles' law would give it, at the top. Pouillet, in the sixth edition of his "Elemens de Physique," adopts a rule, nearly

agreeing with that of Charles, as a deduction from experiment. We shall avoid the necessity of raising the rod to an inconvenient height above the roof of the building, if we use several rods, each of which will protect its own charmed circle, while the united conducting power of all will be in requisition to carry off extraordinary discharges, at whichever rod they may first strike. In oblique discharges, which come from clouds when they are not vertically above the point struck, the degree of exposure is measured, not by the vertical elevation of a rod, but its oblique distance; and it may therefore happen, that the highest point will escape, while one at a less distance will take the discharge from the clouds. In 1824, Leslie advised that advantage should be taken of the copper gutters and spouts of buildings to help the lightning-rod carry off its electrical burden; and Professor Henry has made a similar suggestion in regard to the tin roofs of houses, if they are connected with the ground by metallic pipes.

The precautions, recommended for the protection of powder-magazines from lightning, are peculiar. These magazines are generally surrounded by an atmosphere of fine powder-dust, ready to be inflamed by a small spark originating in some accidental want of continuity in a lightning conductor. Hence, as early as 1776, Toaldo advised that conductors should never be placed directly upon these magazines, but upon masts, at the distance of about 10 feet from them. Where a mistake might involve such great destruction, Toaldo thought it wise for men to stand upon the defensive, and not to be too familiar with the tremendous energies of Nature. Voltaire has likewise said: "There are great dignitaries whom it is only safe to approach with great care; and lightning belongs to the same class." When Gay-Lussac made his Report, in the name of the Commission appointed at the request of the Minister of the Interior, by the Physical Section of the French Academy, to draw up instructions as to the best method of preparing lightning-conductors, he adopted, with approbation, the old suggestion of Toaldo in relation to powder-magazines. But if, as has been intimated before, the proper interpretation of Charles' law requires that the radius of the space protected should be measured by the height of the rod, not above the ground, but above the highest point of the object to be protected, the erection of substantial masts, to sustain these high rods, and at distances from each other, all around the magazine, not exceeding one quarter of the height of the rod itself, will involve no inconsiderable expense. Sturgeon has proposed to line the walls of powder magazines with metal, which would protect the interior of the building from any inductive action.

Did not experience prove the contrary, it would seem superfluous to say that a good lightning-rod must be uninterrupted throughout its whole length, and, when it reaches the ground, must be bent away from the foundations of the building it is intended to protect, and enter to such a depth into the sub-soil as to be surrounded by ground always moist. The lower end of the rod may be soldered to a large plate of metal, or it may be surrounded by a large body of charcoal; not common charcoal, but such as has been heated red-hot; or by coke. Sometimes, the rod can communicate with a well, or other

reservoir of water. It has been proposed that, where practicable, lightning-rods should be attached to the water-pipes under ground. It is an old saying, that the danger is over when the lightning reaches the *well* [ocean.] An artificial fountain may not be large enough to make a good discharging train.

Great improvements have been made since the time of Franklin, in the manner of jointing the several pieces of which the lightning-rod is composed. Formerly, they hooked upon each other like the links of a chain. Dr. King, of Boston, turned up a point on one piece of the rod at right angles to the length. This point entered an eye upon the next piece of rod, and so on. These points answered for oblique charges, but nothing in this arrangement prevents two pieces of rod from disconnecting, if the attachment to the side of the building should give way. Mr. Orcutt connects the rod by means of a hollow nut, cut on the inside, to which is affixed a point. The two pieces of rod screw into this nut until they touch one another. Mr. Strong overlaps the two pieces of rod, and screws a pointed piece through both. But this enumeration does not exhaust all the varieties.

The consequences of being struck by lightning at sea are so fearful, and often so fatal, that the smallest chance of such an accident ought to be guarded against, at any cost. Sir William Snow Harris, of England, deserves credit for having called public attention to this subject of late, and for having improved upon the old method of protecting ships from lightning. The agency was simply a chain, generally stowed away, and left to be raised to the mast-head in the hurry of preparations to meet a storm. Sometimes the men employed in raising it have been killed by the lightning before their work was finished. Sometimes the chain was carelessly short, so that during the rolling of the ship the lower end was lifted out of the water. Besides, in a chain there must be great obstruction and heat at the links. It is no wonder that accidents from lightning still happened to ships so poorly provided, and that these accidents brought the chain itself into discredit; so that, frequently, even public vessels were not provided with one. In the British navy, the old chains were of copper, one-sixth of an inch in diameter, and the links two feet long. They were only supplied when demanded. In the French navy, metallic ropes were used. But Harris' lightning-conductor for ships consists of flat strips of copper let into the masts. They contain twenty times as much metal as the old English chains. There is no break in the strips of copper, as Roberts objected. They do not interfere with the rigging, and they are always in position, ready for use. The mast helps conduct, as is seen by experimenting on a fine wire completely insulated, and on another laid upon a piece of wood. The strips of copper connect with the copper sheathing, and bands also lead off, under deck, to the knees and other pieces of iron in the sides of the vessel.

It is singular, that the question is still an open one, whether the power of a lightning-conductor is proportional to the area, or the circumference, of its cross section. If the question is decided by the analogy of voltaic electricity, as, in the absence of direct experiment, it ought to be, then the conducting power for frictional elec-

tricity is proportional to the mass, and not to the surface, of the conductor. Leslie has said, but I do not know on what experimental authority, that the conducting power for such electricity is measured by the surface of the conductor. Professor Henry has more recently alluded to experiments of his own, which confirm this law. They have never been published; but, as far as I can judge from a brief account of them, which he once gave me in conversation, they prove satisfactorily that electricity tends to travel more and more upon the surface, in proportion to its tension. While the question remains in an unsettled state, it is rash to assume that the conducting power for atmospherical electricity violates the acknowledged law for voltaic electricity. And yet this assumption lies at the foundation of many innovations, and pretended improvements, in the construction of lightning-conductors. J. Murray insists upon this hypothetical law of surface, when he recommends his hollow tubes as a substitute for solid rods, the interior to be kept clean, on the same galvanic principle by which Davy proposed to protect the copper sheathing of vessels. Others, in this neighborhood, have proposed to make conductors of metallic strips, bent so that the cross section is in the shape of the letter S, or of X, or of the letter Z.

Of late, it has become a question of importance, whether any attempt should be made to insulate a conductor from the structure it is designed to protect. There have been those foolish enough to suppose, that the lightning might be received upon a mass of metal which was insulated, not only from the building, but from the ground also, and might then be spit out harmlessly from it into the air. There have been those, again, who, less presumptuous than the former, have not attempted to insulate the rod from the earth, but only from the building. Spratt's rods and Otis' rods are arranged upon this plan. Because metal conducts so much better than air, so much better even than water, it is supposed that the electricity will not leave the metal and go through the glass into the building. One truth, at least, seems to be admitted, by those who espouse the cause of insulated conductors, namely, that lightning may leave a common rod, and go through the supports into the building, instead of rushing to the ground on the rod exclusively. And the question is whether this division of the charge will be prevented by such insulation as is usual, or, as is practicable. Because a glass knob, of a few inches in diameter, will insulate the telegraph wire, it is supposed that a lightning-conductor may be insulated in the same way, no allowance being made for the vast difference between the tension of voltaic electricity and that of friction electricity or lightning. Columns of glass, one or two feet in length, are required to insulate the prime conductor of an active electrical machine, and even these are insufficient in damp weather. How can anything less than this, or even so much as this, suffice to insulate the electricity which flows down the lightning-conductor? It is well known, to those familiar with experimental electricity, that all insulation fails in certain states of the air. For what matters it whether the glass does or does not conduct, if the all-surrounding air fails to insulate? Now, although air, and even water, and consequently damp air, conduct far more feebly than metals, under

the same circumstances, it should not be forgotten that the great bulk of the air which is present and touches the rod everywhere, makes up for the vast disparity in conducting power. Even if the electricity could not go to the building on the damp glass, it may go, and will go, by the damp air. If the electricity has tension enough to strike from the cloud to the earth, an inch or two more or less, of air, will make no great difference, and this small difference may be outweighed by advantages belonging to the extraordinary path. Arago condemns the plan of attempting to insulate the conductor from the building, on the ground that it is an "excess of precaution not worth the cost."

After so much detail in regard to the construction of lightning-conductors, what shall we say of their efficacy, when they are good and in their place? There have always been a few to maintain that the conductor increased the liability to being struck. Frederick the Great was not so great that he did not take sides against Franklin's invention. He would not allow a conductor to be placed upon his own château at Sans-Souci, though he yielded to the advice of the Berlin Academy so far as to have conductors on his arsenals, barracks, and powder magazines. Cavendish was so sanguine in favor of artificial conductors, as to say that the chances of escape were increased in the ratio of four hundred million to one. Leslie decided against the efficacy of lightning-conductors, in consequence of his peculiar views of electrical conduction, which he supposed to be solely by currents of air. The whole effect he regards as only one drop in the ocean. He estimates that a thousand years would be necessary to neutralise a thunder-cloud with a pointed conductor, and ten thousand years with a blunt one. Nevertheless, he says, "If happiness consists merely in idea, why not indulge delicious error?" The English electrician, Walker, is so confident of Harris' conductors, as to say that he would willingly make his couch within the powder-magazine of a ship which carried them. And, with respect to the faith of men in lightning-conductors in general, Harris asks, "Is not every powder-magazine in Europe protected by rods?" A little less than a century ago, the poor-house at Heckingham was struck by lightning, in spite of its eight rods, and instances of buildings, though having the same protection, sharing a similar fate, may be multiplied from the annals of any country. No doubt, a principle reason of the former failure of the lightning-rod to protect was, the carelessness with which it was put up. Murray alleges that nine-tenths of the conductors in Great Britain are worse than useless, because of their faulty construction.

I am far, however, from claiming for any rod, however complete in its appointments, the power of perfectly protecting from lightning. In their zeal to vindicate the virtues of the artificial lightning-rod, or of their peculiar way of constructing it, and because the material of which the rod is composed is a better conductor of electricity than the materials of the structure it is designed to protect, some maintain the lightning cannot possibly strike anything but the conducting rod; and that when it strikes that, there is no possibility of the lightning, or a part of it, leaving this conductor for other bodies. But I claim less than this. The greatest service which the lightning-con-

ductor renders, is when, by its uplifted point, it silently, and, at a great distance, neutralises the electrical excitement of the cloud while it is approaching into a dangerous neighborhood; so that, when it has come within striking distance, much of its power to strike has been withdrawn. How effectually the point operates to this end may be learned, not from theory merely, but from observation and experiment; yet, when, from the insufficient number of these points, or the extraordinary excitement of the cloud, or the rapidity with which it is driven overhead by the wind, the lightning strikes with violence upon the conductor, although the effect may be much less terrible than without any conductor, I do not suppose that, in all cases, the stroke will be harmless. Franklin confessed as follows, of his own invention: "If God, for our sins, should think fit to rain fire upon us, as upon some cities of old, it is not expected that our conductors, of whatever size, should secure our houses against a miracle."

Those best acquainted with the science of electricity are at a loss, when they are called upon to define the nature of electricity and its dynamical conditions. Nevertheless, they are generally agreed in assuming it, provisionally, to be a delicate, elastic fluid. In its statical equilibrium, it justifies the expectations founded upon this analogy. The dynamical division of mechanical electricity is conversant, not so much with the manner in which electricity is propagated, as with the effects which it produces while under way. If we carry, however, into electro-dynamics, the analogies which statical electricity suggests, whether we suppose the electrical force to be propagated through the electrical fluid, as a wave, after the analogy of light, heat, and sound, or to flow directly and bodily, as common fluids may, in either case, there is no good reason for narrowing the motion down to a single channel.

By direct or secondary radiation, and by reflection and refraction, double and single, the original central disturbance is broken up and sent out in a multiplicity of directions, according to the fundamental law of wave motion. Or, in the other point of view, a liquid, especially when under a great head of pressure, does not confine itself to a single channel, however broad and deep, but embraces the first opportunity to swell out laterally, trespassing upon its old banks, and sometimes carving out for itself new fortunes, by washing out fresh channels. In similar ways, if not for similar reasons, electricity divides itself between all the channels which are presented to it; and, although the best may carry the largest part of the charge, it holds no monopoly in Nature. This division of the charge, particularly if a heavy one, is indicated most unequivocally in experiment, and often stands out prominently to observation from the great laboratory of nature. Lightning follows the course of least resistance; and whenever the sum of the two resistances in two different courses is less than the resistance in a single course, the lightning will divide more or less equally between them. This division of the charge has been triumphantly proclaimed by the telegraph posts, when the wire has been struck. In 1845, on the line between New York and Philadelphia, eight of the posts were struck simultaneously. According to Landernann, in 1718 twenty-four churches were struck, but only

three explosions were heard. When the steeple of St. Bride's was struck, although there seemed to be but one stroke, eighteen holes were pierced, nine with beards on one side, and nine with beards on the other. If a small electrical conductor is insulated, and several branches of chain are hung from it, with the ends touching the ground, whenever a spark from the prime conductor of an electrical machine, or from a Leyden jar, is sent to it, all the chains are lighted up, each, under the same circumstances, to the degree in which it conducts. There is no end to the experiments which might be adduced to prove this law of division, said to have been first pointed out, by Cavendish, in 1776. When the conductor of an excited electrical machine is connected, by a substantial chain or wire, to the earth, it is still possible to take a spark, bright or faint, from it, by touching it even with a poorer conductor. The galvanic current submits to the same law. If we connect the two poles of a galvanic battery, by a stout wire, and then attach, to two points of it, the fine wire of a galvanometer, this instrument will show that a part of the current has been diverted from the highway, and has run into the by-way. Professor Joseph Henry stated to the British Association for the Advancement of Science, when it met at Liverpool in 1837, that a copper wire, one-eighth of an inch thick, the lower end of which entered a well, and the other terminated in a ball near the prime conductor of an electrical machine, gave out, when the machine was in action, sparks sufficient to inflame Volta's pistol. He also attached to the middle of a lightning-rod such a ball, and when sparks an inch and a half long were thrown on it from the machine, lateral sparks could be drawn from the rod at any point, even above the ball, and as far up as the top. This experiment I have often repeated, by attaching firmly a stout piece of wire, three-eighths of an inch in diameter, to a lightning-rod, and bringing it into my lecture-room. For the same reason, a slight shock is felt in grasping a wire through which a spark is sent from a machine to the earth. A wire, 27 feet in length, attached to one of the discharging rods, three-eighths of an inch in diameter, gave out sparks, through its whole length, to a ball 2 inches in diameter; and "dense sparks in a continuous volley" were sent to the ball, when it was held near to the safety-rod itself, although the ground had become very wet. This law of the probable, or at least the possible, division of the lightning, warns us not to trust too implicitly, and even wantonly, to the efficacy of the lightning-rod, and to avoid, in the construction and furnishing of buildings, an arrangement of metal, between the roof and the ground, which might tempt the lightning to divide with it and the proper conductors; and, at any rate, when such a broken metallic circuit exists, to keep ourselves out of a position which would make us a part of its communication with the ground. I should hardly agree with the distinguished Faraday, that a man might lean against Harris' conductor without being injured. What has been said, in relation to this division of the charge, shows the advantage, in another view, of placing lightning-conductors at the four corners of a building, and upon all the masts and the bow-sprit also of a ship, especially if they are all united into one system by horizontal bands of metal. If the charge can freely

divide between so many conductors, its tension is so much relieved that it is less likely to seek still other ways of reaching the earth. A charge of lightning, which would be fatal if received upon one conductor, is often so divided as to be harmless. Dr. King saw a military company receive a charge from the clouds, upon their uplifted bayonets, without flinching. Another similar case occurred in 1842. When the State Prison in Charlestown, Massachusetts, was struck, on the 30th of July, 1829, in spite of its three conductors, three hundred persons, over a space of 500 feet, felt the shock, though no one was injured. An armory of guns and pikes was in the neighborhood.

I do not think that Mr. Harris is successful, in his attempt to make a distinction between Henry's experiment upon the lightning-rod and the case in which the lightning descends upon a rod. Harris asks if sparks have ever been taken from a rod at such times. Perhaps there is no instance on record, though Kinnersley states that once the lightning was seen to spread around the ground at the foot of the conductor. Experiment shows, not only that electricity will leave an ample conductor, and jump, in part, to poorer conductors, which either pursue a distinct route all the way to the ground, or finally unite again with the main channel, but also that it will overflow the masses of metal which are insulated. To illustrate this, I have been in the habit of using a stout wire, lashed by a metal wire to a lightning-rod, as before described. I insulate the hydrogen cannon, which belongs to the thunder-house apparatus, by placing it upon a wine-glass, and bring the knob near to the stout wire. Whenever a spark from an electrical machine is sent to the discharging train, the hydrogen is fired by the small portion of electricity which leaves the rod and enters the knob of the cannon.

The principle which regulates this movement I understand to be this: All bodies strive to acquire their share of free electricity, which is greater or less, according to their shape and position. If the earth were a great metallic ball, so that electricity received from the clouds at any spot were instantly diffused, the portion which would be allotted to a small insulated body, such as I have supposed, would be very minute. But this is not the case. Parts of the earth's surface are insulated, more or less perfectly, from each other. Hence, a small body may take at first more than it will afterwards be able to retain, when there has been time for the final distribution. On this account, there is need of observing the following rule, in which the best English authorities, on this subject, as Farraday, Walker, Sturgeon, and Harris, are agreed, although the latter is sometimes inconsistent in his statements with regard to it, namely, that lightning conductors should be removed as far as possible from other metallic bodies, even when the latter are insulated; or, when a dangerous proximity cannot be avoided, that the exposed masses of metal should be substantially connected to the lightning conductor by the most direct and easy path for electricity. In this way, the electricity which supplies these bodies can spread quietly into them, and afterwards, if necessary, any surplus may return to the rod and pass down into the earth; whereas, otherwise, if the way is obstructed, the electricity will accumulate until it breaks open a lateral path for itself by violence.

The effects of lightning, when it strikes, next claim our attention. They are, of course, the same as those of electrical discharges in general. But we distinguish, as the especial work of the thunderbolt, those effects of electricity which characterise frictional electricity much more than those in which voltaic electricity excels. Besides the sound and the flash, which, though local in their origin, are heard and seen at a distance all around, I have to speak more particularly of the calorific, mechanical, and physiological effects of electricity, which are essentially local. These effects of electricity originate in the resistance which imperfect conductors offer to its passage, and this resistance arises, either from the nature of the material, or the small size of the body which transmits the charge. "Hence," says Aristotle, "resisting substances suffer something; but those which do not resist suffer nothing." But his illustrations are not good. Even a metal may not be so large, in relation to the charge which it carries, as to escape destruction.

First, of the calorific effect: Imperfect conductors are often ignited by lightning, in its passage through them, and the metals, if not very stout, are fused, or even volatilised. Aristotle, Lucretius, Seneca, and Pliny had observed this fusion; but, with their relation of facts, there is mixed up much which is fanciful. It was pretended that money could be melted in the pocket, or in a bag, or a sword in its scabbard, or a javelin on its handle, without the pocket, the bag, the scabbard, or the handle exhibiting any traces of heat; and hence arose the notion of a cold fusion, produced directly by lightning, without any development of heat—a notion which Franklin countenanced at one time, though he afterwards corrected himself. In many cases, especially in metals, it may be difficult to trace the effects of heat, because conductors of heat cool so rapidly. But that the fusion of metals, when produced by lightning, is a consequence of heat, is proved by the fact, more than once observed, that the globules of melted metal have singed the matter upon which they fell. When the ship New York was struck by lightning, in 1827, the drops of burning metal scorched the deck. "Need I add," says Kaentz, "that a fire kindled by lightning is as easily extinguished as any other." There are certainly cases of extraordinary escape. When the theatre at Mantua was struck, on the 20th March, 1784, the electricity melted ear-rings and watch-keys without wounding those who wore them. On the 15th of November, 1755, the magazine of Maromme, near Rouen, was struck by lightning, and two casks of powder were scattered, without its being ignited. And again, on the 11th of June, 1775, some cases of powder, in the tower at Venice, were overturned, but not exploded. Hence, some have concluded that lightning will not set fire to powder. It may, indeed, be difficult to fire the powder, as in experimental electricity, the mechanical disturbance scattering it, and removing it from the influence of the heat which electricity always elicits in its passage along poor conductors. The heating effect diminishes as the size of the metal acted on increases. We must try to ascertain the largest rod which has ever been melted by lightning, and then we shall be able to assign the minimum value to the size of a good lightning-rod. Captain Cook, while in the Roads of Batavia,

saw his lightning-conductor, which was five millimetres in diameter, all on fire. Franklin recites the case of a church in Newburgh, where a small wire conducted the charge, though it was melted in performing this service. Harris says that there is no instance on record in which a bolt or chain of any considerable magnitude has been heated much. It is not known that a copper wire of one-half an inch has ever been heated red-hot. Captain Dibdin relates that, at Martinico, a bar one inch in thickness was diminished in size by being struck by lightning, and in some places was reduced to the size of a small wire. In 1773, the conductor on St. Paul's Cathedral, London, which was of iron, and 4 inches broad by half an inch thick, showed marks of having been heated, though perhaps not red-hot. Large bars of iron, in contact, if not fused, have been softened so much as to become welded. The links of a chain have united in this way to form a rod, and a key has solidified to the ring on which it was hanging. Boyle saw the lightning strike a table on which were two drinking-cups. One was slightly bent, but the other suffered so much that it could hardly stand. They must have been softened by heat to admit of so great a change of figure without breaking. A wire, through which the lightning, or a heavy charge from a Leyden battery, has passed, is shortened, and therefore sometimes broken, by the mechanical strain upon it.

I now pass to the *mechanical* effects of electricity, which are very curious, and in their details inexplicable. Trees are split longitudinally into thin laths, or so as to resemble an old broom. Arago describes instances of this sort, and I have seen the same effect upon a tree struck by lightning in Cambridgeport, Massachusetts. Limbs of trees, over 20 inches in diameter, have been cut short off. The iron bar of a shade to a store, in Boston, has been bent to a right angle. Lights are extinguished. This occurred when the theatre of Feltre was struck, on the 26th of July, 1759, and also when a building was struck in Harrison Avenue, Boston, a few years ago. The bark of trees is thrown 30 or 40 feet. On the 11th of June, 1849, an oak, 14 feet in circumference, was struck, where other trees had suffered before, and parts of it were split up fine enough for Lucifer matches. The lightning often goes between the bark and wood, because the sap conducts. The wood itself is a poor conductor, or it would not be so badly torn. Muncke saw an oak, 3 feet in diameter, shivered into filaments. Mr. Wilson states that a bar of iron, half an inch thick, and two inches and a half broad, was bent and broken, when St. Bride's steeple, in London, was struck. On one occasion, a block of mica-schist, 28 by 7 and 5 feet, was thrown 50 yards. A wall, consisting of seven thousand bricks, was raised and transported, one end 9 feet and the other 4 feet.

It is a remarkable fact, that the fragments of bodies struck by lightning are dispersed in *all* directions. Masses of stone, weighing 170 pounds, are thrown, one 60 yards to the south, and another 400 yards to the north. Men, too, have been thrown in opposite directions. The hoops of masts which have been struck come rattling down. Franklin referred such effects as we have described to the vapor, suddenly generated from the moisture contained in the body

struck, when subjected to the electrical heat. Watt exclaimed, upon seeing some holes made in the sand by lightning: "Behold the effects of steam, generated by heat!" Harris also says: "Lightning exhibits, in non-conducting intervals, the effects of an explosive force." Arago supports this view as his own. His experiments, and those of Dulong, show that the elastic force of steam, when heated to 500° F., amounts to forty-five atmospheres. This temperature is far below that of red-hot iron, which is 2,000°. In founderies, when a small quantity of water is by accident in the mould, into which the melted liquid is poured, a terrible explosion occurs. Rocks contain water in their fissures, the trees have sap in their cells, and the ground is not without its buried moisture. The mechanical effect certainly suggests the agency of some highly elastic fluid, generated by the lightning. But it has been objected to this view, that many of the substances exploded are non-conductors of heat, so that it could not easily reach the moisture, supposed to be present in their interior, in force sufficient to convert it suddenly into high-pressure steam. Another explanation, preferred by Dr. Lardner, is, that the lightning strives by induction to decompose the natural electricities of bodies; and that, when they are non-conductors, they are broken by the efforts of the two electricities to separate upon them.

The mechanical effect, produced by the passage of a given amount of electricity through a body, is proportional to the resistance it encounters. The violence, therefore, is local, and appears wherever a good conductor terminates, or is interrupted. When the spire of a church in Kingsbridge was struck, no damage was done, until the lightning reached the end of the spindle to the weather-cock. On the 18th of June, 1764, a church in South Weald, Essex, was struck by lightning, and also the steeple of St. Bride, London. The charge descended quietly until it reached the end of the spindle in the steeple, and then commenced its ravages. A stone, weighing 72 pounds, was carried horizontally 150 feet, besides falling 200 feet. The steeple suffered particularly, in consequence of being fastened by iron clamps. Eighty-five feet of it were taken down to be rebuilt. In one place, where there was much lead and iron, 1,200 pounds of stone were thrown down; 25 tons in the whole were damaged, and all in the neighborhood of iron. In 1750, one of the stones of this spire, 7 feet from the top, was observed to project several inches, and the steeple was taken down and rebuilt. The cause was not suspected at the time, but after the accident, in 1764, it was thought that it might have been done by a former stroke of lightning. The accident to St. Bride's excited apprehension for St. Paul's spire, which is 100 feet higher.

Another effect of lightning is called *physiological.* When animals are injured or killed by it, either the nervous system is paralysed, or the vascular system is torn. In the latter case, perhaps, the action might properly be called mechanical. On the 2d of June, 1849, a battalion of French infantry were struck, between Monzon and Stenay. Two men were killed, and two hundred more were struck to the ground. Blood issued from their mouths, ears, and noses. When the lightning passes through a series of men, or other animals, the extreme

ones are most injured. The greatest violence is always done where the electrical fluid enters or leaves a non-conductor. In 1785, a file of thirty-two horses was struck. The first was killed, the last was severely hurt, while the others were only thrown down. In 1808, five children on the same bench were struck, and the first and last only were killed. Once, when five horses were struck, the first two and last two were killed, and the middle one escaped. It was supposed at Flavigny, where this occurred, that the horse which escaped owed his safety to his blindness! But, in another instance, when five horses were struck, the three nearest the middle escaped. A miller, between a horse and a mule, was not injured, though both the beasts were killed. The heel is a bad conductor, and hence it is often perforated. There is no end to the apparent eccentricities and pranks of the lightning. Horses have been killed and not their riders. Dogs have been killed, the men in company with them escaping. When the British ship of the line, Tonnant, was struck, in 1804, one man was killed, while in the arms of another man, who was not hurt.

Again, a place which is struck by lightning is recognised by a peculiar smell, which has been compared to that of sulphur, phosphorus, or nitrous-acid gas. Wafer observed this peculiar smell on the Isthmus of Darien; during showers it took away the respiration. In 1771, Gentil passed a place in the Isle of France, four hours after it had been struck, and recognised the strange smell, although it had rained much. When the ship Montague was struck, in 1749, it seemed to be filled with sulphur. Also, when the New York was struck, in 1827, there were clouds of sulphurous smoke, but no fire. When a building was struck, in 1778, the smell lasted a day and night. In 1770, a church, which was struck, was filled with this sulphurous odor, almost to suffocation. Some have supposed the smell in these cases to come from nitrous-acid gas, which has been formed by the decomposition and recomposition of the atmosphere. Cavendish produced nitric acid by sending a charge of electricity through a tube full of atmospheric air. In 1827, Liebig, in illustration of this point, examined seventy-seven samples of rain-water. In seventeen cases, when thunder had occurred, the acid was found. In fifty-eight of the other cases, the acid was not detected. So it has been thought that lightning, so frequent in tropical countries, explains the presence of nitrates where animal substances are not found. How wonderful, if one element of gunpowder (nitre) should be elaborated by the lightning, which is heaven's artillery! Is the acidity alleged to be produced in milk by thunder, the effect of nitrous-acid gas? Lardner thinks that the testimony of brewers, cooks, and butchers in favor of the effects of lightning in curdling milk, souring beer and wine, and in changing meat, is not to be lightly esteemed. In 1840, Professor Schönbein, of Basle, discovered a substance to which he gave the name of *ozone*, and which is supposed to be a tritoxide of hydrogen. This he considers as the origin of that peculiar smell which all familiar with electrical experiments have observed when sparks are emitted from an electrical machine, or when water is decomposed by voltaic electricity, and which Weekes particularly noticed, in the working of his apparatus for studying atmospherical electricity.

Volta supposed that the formation of hail was an electrical phenomenon, the moisture collecting and congealing upon the *nucleus* of the stone, while it danced up and down between two strata of clouds, like the little images of pith between the positive and negative plates in the familiar electrical experiment. However this may be, the fall of hail is an exhibition which often attends a violent thunder-storm. In some parts of Europe, as France, Switzerland, and Italy, hail-stones are so frequent and so destructive, that insurance companies have been formed to equalise the losses, and protect the suffering individual. In 1764, it was written by the French envoy that there never was a year in which the hail did not ravage half, and sometimes three-quarters, of the diocese. The storm of July 13, 1788, struck a thousand and thirty-nine *communes*, causing, according to an official statement, a damage equal to $5,000,000. During a thunder-storm, pieces of ice 5 or 6 inches in diameter, have been found in Derbyshire. On November 1, 1826, a violent storm of thunder and hail laid waste Wolverhampton, and one gentleman suffered, to the amount of $750, by the breaking of glass in his hot-house. On May 2, 1811, great havoc was caused by the bursting of a cloud against a hill in Shrewsbury. The hail stood a foot in depth, and most of the stones were 2 inches in diameter. On June 21, 1828, in Hanover, the hail was a foot deep, and as large as duck's eggs; it did not melt away for six hours. Murray adds, that he has seen fields of grain, near Verona, taken down by the hail as smoothly as if a scythe had passed over it.

In 1788, Pinnanzi proposed lightning-rods as a preventive of hail, by silently discharging the electricity of the clouds, and anticipating the formation of the hail. The French Academy reported favorably. Such rods were at one time extensively used in France, Switzerland, and Italy. In 1829, they were attempted in America. These rods were made 35 feet high, and placed 140 feet apart. It was urged in favor of these *paragrêles* that those who used them were saved from from the losses which afflicted their neighbors. Murray says that, in 1825, he could not find in Switzerland a single case of failure. According to Babinet, the experiment was made successfully in Switzerland and Italy, under the advice of the Linnæan Society of Paris. But there were not wanting those who considered *paragrêtes* as insulting to Providence. They met with frequent attacks. As some one pithily remarked, "La grêle seule les épargne." Notwithstanding all that has been said in their favor, the great meteorologist, Kaemtz, does not seem to trust their efficacy in reducing the electricity of the clouds. He asks, "Are not the houses at Zurich studded with rods, and yet thunder-storms are just as frequent as before?" Romas and Charles, in France, and Dr. Lining, in Charleston, South Carolina, noticed, in their experiments, that whenever the clouds had been drained of electricity by kites, the thunder and lightning ceased. Arago, therefore, recommends kites as a defense against hail-stones. Perhaps captive ballons would answer the same purpose, and protect the vineyards. Gay-Lussac, in his report on lightning-rods, made to the French Academy, in 1823, renews the claim of rods, and intimates that, if they were placed on very high steeples, as that

of Strasbourg, which is 437 feet above the ground, and were sufficiently multiplied, hail might be prevented.

Not only does lightning figure on its own special arena, the thunder storm, but it acts a conspicuous part in every grand elemental display of nature; as, in the tornado and the volcano. Sometimes no thunder is heard, but perhaps other noises distract the attention of the observer. Pliny the younger alludes to the lightning which attended the eruption of Vesuvius, in the year 79. The smoke, which spread at the eruptions in 1182, 1631, and 1707, emitted lightning, by which sometimes men and other animals were killed. The same was true of the eruptions of 1767, 1779, and 1794. On the last occasion, a cloud of ashes was taken to Tarentum, three hundred miles away, the lightning of which struck a building and destroyed it. Seneca records similar electrical exploits of Mount Etna, which were repeated in 1755. The smoke which appeared at the uprising of the new Azore, (now departed,) in 1811, was resplendent with lightning. The strange volcanic island, which started up near Sicily, in 1831, had the same electrical celebrity. If the lightning is generated in these convulsions, by the sudden formation of aqueous vapor, what can be said of the case of 1794? For a great vapor must be soon condensed. Is friction, therefore, the electro-motive force?

Finally, I may notice the light enjoyed in cloudy nights, which cannot, Arago supposes, come from the stars, but from the phosphorescent clouds. It is never so dark out of doors as in a subterranean apartment, or in a room without windows. During the dry mist of 1783, the sky was as bright as during a full moon when over-clouded. Is this light the glow-discharge of electricity? If so, has the solar light the same electrical origin, more intensely developed? And is the colored light, which Nicholson saw in the clouds on the 30th of July, 1797, the result of processes similar to those that give a color to certain of the stars which differ from the white sunlight?

METEOROLOGY

IN ITS CONNECTION WITH AGRICULTURE.

BY JOSEPH HENRY, SECRETARY OF THE SMITHSONIAN INSTITUTION.*

All the changes on the surface of the earth, and all the movements of the heavenly bodies, are the immediate results of natural forces, acting in accordance with established and invariable laws; and it is only by that precise knowledge of these laws, which is properly denominated science, that man is enabled to defend himself against the adverse operations of Nature, or to direct her innate powers in accordance with his will. At first sight, it might appear that meteorology was an exception to this general proposition, and that the changes of the weather, and the peculiarities of climate, in different portions of the earth's surface, were of all things the most uncertain, and farthest removed from the dominion of law; but scientific investigation establishes the fact, that no phenomenon is the result of accident, nor even of fitful volition. The modern science of statistics has revealed a permanency and an order in the occurrence of events depending on conditions in which nothing of this kind could have been supposed. Even those occurrences which seem to be left to the free will, the passion, or the greater or less intelligence of men, are under the control of laws, fixed, immutable and eternal. No one knows the day nor hour of his own death, and nothing is more entirely uncertain than, in a given case of expected birth, whether a boy or a girl shall be born; but the number out of a million of men living together, in one country, who shall die in ten, twenty, forty or sixty years, and the number of boys and girls who shall be born in a million of births, may be predicted from statistical data with almost unerring precision. The statistics of courts of justice have disclosed the astonishing fact, incomprehensible to our understanding, because we do not know the connecting influences which concur to produce the result, that in every large country the number of crimes, as well as each kind of crime, can be foretold for every coming year, with the same certainty as the number of births and deaths. Of every hundred persons accused before the supreme tribunal in France, sixty-one are condemned; in England, seventy-one—the variation on an average, from these numbers hardly amounting to a hundredth part of the whole. Not only the number of suicides, in general, for several years to come, can be foretold with confidence, but also the relative proportion by fire-arms and by hanging. The astonishing facts of this class lead us inevitably to the conclusion that all events are governed by a Supreme Intelligence, who knows no

* DEAR SIR:—In accordance with the arrangements made between your Office and the Smithsonian Institution, for the purpose of cooperation in the advance of meteorology, I have the honor to present you a communication, intended to accompany the summary of meteorological observations for the years 1854 and 1855.

Very respectfully, your obedient servant,

JOSEPH HENRY, *Secretary*

To Hon. CHARLES MASON,
Comissioner of Patents.

change, and that, under the same conditions, the same results are invariably produced. If the conditions, however, are permanently varied, a corresponding change in the results will be observed; for example, the effect of the introduction of an extended system of moral education, in diminishing crime, would be revealed by the statistics. It is this regularity which is observed in phenomena, when studied in groups of large numbers, which enables us to arrive at reliable and permanent laws in regard to meteorology, and to predict, with certainty, the average temperature of a given place for a series of decades of years, and which furnishes the basis, in accordance with the principles of assurance, of a knowledge of what species of plant or animal may be profitably raised in a given locality. We, however, need not, in this branch of knowledge, as in that of the statistics of crime, be confined to the mere discovery of the existence, and the measure of the constants of nature, but, uniting the results of observations with those of experiments in the laboratory, and mathematical deductions from astronomical and other data, we are enabled, not only to refer the periodic changes to established laws, but also to trace to their source, various perturbing influences which produce the variations from the mean, and thus arrive, at least, at an approximate explanation of the meteorological phenomena which are constantly presented to us.

No truth is more important in regard to the material well-being of man, and none requires to be more frequently enforced upon the public mind, than that the improvement and perfection of art depend upon the advance of science. Although many processes have been discovered by accident, and practised from age to age, without a knowledge of the principles on which they depend, yet, as a general rule, such processes are imperfect, and remain, like Chinese art, for centuries unchanged or unimproved. They are generally wasteful in labor and material, and involve operations which are not merely unessential, but actually detrimental. The dependence of the improvement of agriculture upon the advance of general science, and its intimate connexion with meteorology in particular, must be evident, when we reflect that it is the art of applying the forces of Nature to increase and improve those portions of her productions which are essential to the necessity and comfort of the human race.

Modern science has established, by a wide and careful induction, the fact that plants and animals principally consist of solidified air, the only portions of an earthy character which enter into their composition, being the ashes that remain after combustion. All the other parts were originally in the atmosphere, were absorbed from the mass of air during the growth of the plant or animal, and are given back again to the same fountain from which they were drawn, in the decay of the vegetable, and in the breathing and death of the animal.

The air consists of oxygen, nitrogen, carbonic acid, the vapor of water, traces of ammonia, and of nitric acid. A young plant, placed in the free atmosphere, and exposed to the light of the sun, gradually increases in size and weight, and receives carbon constantly from the carbonic acid of the air, which is decomposed, and evolves the

liberated oxygen. The power by which this decomposition is produced is now known to be due to the solar ray, which consists of a peculiar impulse, or vibration, propagated from the distant sun, through a medium filling all space.

It is a principle of nature, that power is always absorbed in producing a change in matter. This change may be permanent, or it may be of such a character, as to reproduce the power which was expended in effecting it. For example, the moving power of a cannon ball is permanently expended in passing into the side of a ship; but if the same ball were shot into the mouth of another cannon, and made to compress a spring, the recoiling of the latter would give to the ball, in an opposite direction, precisely the same velocity which it had expended in compressing the spring, supposing nothing lost by friction, &c. This example serves to illustrate the effect of the impulse from the sun. It decomposes the carbonic acid which surrounds the leaf of the plant, or, in other words, overcomes the natural attraction between the carbon and the oxygen of which the acid is composed; and, in this effort, the motions of the atoms of the etherial medium are themselves stopped. The power, however, in this case, is not permanently neutralised; for, when the plant is consumed, either by rapid combustion or by slow decay; that is, when the carbon and the oxygen are again suffered to rush into union, to form carbonic acid—the same amount of power is evolved in the form of light, heat, or nervous force, which was absorbed in the original composition. If the plant, moreover, be consumed in the animal, the same power is expended in building up the organisation, in producing locomotion and the incessant action of the heart, and the other involuntary movements necessary to the vital process.

Plants are, therefore, the recipients of the power of the sun-beam. They transfer this power to the animal, and the animal again returns it to celestial space, whence it emanated. Properly to so direct this power of the sun-beam, that no part of it may run to waste, or be unproductive of economical results, it is essential that we know something of its nature; and the lifetime of labor of many individuals, supported at public expense, would be well expended in exclusive devotion to this one subject. The researches which have been made, in regard to it, have developed the fact, that the impulses from the sun are of, at least, four different characters, namely, the lighting impulse, the heating impulse, the chemical impulse, and the phosphorogenic impulse; and it has further been ascertained that, though each of these impulses may produce an effect on the plant, the decomposition of the carbonic acid is mainly due to the chemical action. A series of experiments is required to determine the various conditions under which these impulses from the sun may be turned to the greatest amount of economical use, and what modifications they may demand, in order to the growth of peculiar plants. The fact has not yet been clearly ascertained, whether some of these emanations cannot be excluded with beneficial result, or, in other words, whether they do not produce an antagonistic effect, and what relative proportions of them are absorbed by the atmosphere, or reflected from our planet, without reaching the earth, by the floating clouds of the air.

To determine these, requires a series of elaborate experiments and accurate observations. We have said that the chemical vibration is that which principally decomposes the carbonic acid, in the growth of the plant; but we know that the heating impulse is an auxiliary to this, and that heat and moisture are essential elements in the growth of vegetation. The small amount of knowledge we already possess of the character of the emanations from the sun, has been turned to admirable account in horticulture. In this branch of husbandry, we seek, even more than in agriculture, to modify the processes of nature; to cultivate the plants of the torrid zone amid the chilling winds of the northern temperate zone; and to render the climate of sterile portions of the earth congenial to the luxurious productions of more favored regions. We seek to produce artificial atmospheres, and to so temper the impulses from the sun, that the effects of variations in latitude, and the rigor of the climate, may be obviated.

From all that has been said, therefore, it will be evident, that the hopes of the future, in regard to agriculture, principally rest upon the advance of abstract science—not upon the mere accumulation of facts, of which the connexion and dependence are unknown, but upon a definite conception of the general principles of which these facts are the result. All the phenomena of the atmosphere should be studied and traced to the laws on which they depend. The labor bestowed upon investigations of this kind is not as, the narrow-sighted advocate of immediate utilitarian results would affirm, without practical importance; on the contrary, it is the basis of the highest improvement of which the art of agriculture is susceptible. On every acre of ground, a definite amount of solar force is projected, which may, under proper conditions, be employed in developing organisation; and the great object of the husbandman is, to so arrange the conditions, that the least amount possible of this may be lost in uneconomical results. Independent, however, of the practical value of a knowledge of the principles on which the art of agriculture depends, the mind of the farmer should be cultivated, as well as his fields, and, after the study of God's moral revelation, what is better fitted to improve the intellect than the investigation of the mode by which He produces the changes in the material universe.

The climate and productiveness of a country are determined, first by its latitude, or its distance on either side of the equator; second, by the configuration of the surface, as to elevation and depression; third, by its position, whether in the interior of a continent, or in proximity to the ocean; fourth, by the direction and velocity of the prevailing winds; fifth, by the nature of the soil; and, lastly, the cultivation to which it has been subjected.

First, in regard to latitude: The productive power of a soil, other things being the same, depends on two circumstances, solar radiation and moisture; and these increase as we approach the equator.

If the kind of food were a matter of indifference, the same extent of ground which supports one person at the latitude of 60° would support twenty-five at the equator; but the food necessary to the support of persons in different latitudes varies with respect to quality, as well as to quantity, and the other conditions mentioned, with re-

gard to climate, should enter largely into the estimate we form in relation to the actual productiveness of different parallels of latitude.

Though some of the heat of the sun is absorbed, in its passage through the atmosphere, yet by far the greater portion, particularly at the equator, arrives at the surface of the earth, is absorbed by the soil, and is imparted to the stratum of air in contact with it. From various determinations, it is a well-established fact, that the temperature of celestial space, beyond our atmosphere, is at least 50° below the zero of Fahrenheit's scale. The upper surface of the atmosphere, and the arctic regions, must, therefore, partake of this low temperature, while that of the lower stratum, at the surface of the earth, is, at the equator, about 80°. The air, therefore, diminishes in temperature, as we ascend, but the rate of this diminution varies, within certain limits, in different parts of the earth; and, to settle the law of diminution definitely, a series of observations, by means of ascents in balloons, will be required. For practical purposes, however, we may assume, in the temperate zone, that the diminution due to altitudes, or mountains, is about 1° of Fahrenheit for 300 feet. Furthermore, the air, as we ascend, and the pressure of the superincumbent strata is removed, becomes lighter; and, though the temperature of the several portions diminishes very rapidly, yet the whole amount of heat in each pound of air is very nearly the same. For example, if a certain weight of air were carried from the surface of the earth to such a height that it would expand into double its volume, the heat which it contained would then be distributed throughout twice the space, and the temperature would consequently be much diminished, though the absolute amount of heat would be unchanged. If the same air were returned to the earth, whence it was taken, condensation would ensue, and the temperature would be the same as at first.

On this principle, a wind passing over a high mountain is not necessarily cooled; for the diminution of temperature, which is produced by the rarefaction of the ascent, would be just equivalent to the increase which is due to the condensation in an equal descent. This would be the case if the air were perfectly dry; but, if it contained moisture, paradoxical as it may seem, it would be warmer when it returned to the lower level than when it left it. In ascending to the top of the mountain, it would deposit its moisture in the form of water or snow, and the latent heat given out from this would increase the heat of the air, and when it descended, on the opposite side, to the same level from which it ascended, it would be warmer, on account of this additional heat. The configuration of the surface of our continent, on this account, has therefore a marked influence on the temperature of its different parts.

The effect of the position of a country, as regards its proximity to the ocean, on its climate, will be evident from the facts relative to the radiation and absorption of heat by different substances. All bodies, on the surface of the earth, are constantly receiving and giving out heat. A piece of ice, exposed to the sun, sends rays to this luminary, and receives in return a much greater amount. The power, however, of radiating and receiving heat, in different bodies, is very variable.

Water, exposed to the same source of heat, receives and radiates far less in a given time than earth; consequently, the land, especially in the higher latitudes, during the long summer days, or during the growing season, receives much more heat than the corresponding waters of the same latitude; and, though the radiation at night is less from the water than the land, yet the accumulating increase of temperature of the latter will be much greater than that of the former. The reverse takes place in the winter. While, therefore, the mean temperature of the ocean and of the land, in the same latitude, may remain the same, the tendency of the land is to receive the greater portion of the heat of the whole year during the months of summer, and thus, by a harmonious arrangement with respect to the production of organic life, to increase the effect of the solar radiation, and to widen the limits within which plants of a peculiar character may be cultivated. Proximity to the sea, however, has another effect on the climate, which depends upon the currents of the former, by which the temperature of the earth, due to the latitude, is materially altered. Heated water is constantly carried from the equatorial regions towards the poles, and streams of cold water returned, by means of which the temperature of the earth is modified, and the extremes reduced in intensity. The great currents of the ocean are seven in number, and may be best and most clearly described in connexion with a hypothesis as to their origin. For this purpose, let us suppose the earth at rest, and the equatorial regions continually heated by the sun, in his diurnal revolutions. In this condition, a continuous current of air from the north, and another from the south, would blow towards the equator, there ascend, and flow backward, in the upper regions, towards the poles. If we next suppose the earth to be in motion, on its axis, from west to east, and compound the effects of this motion with that of the winds towards the equator, on either side, they will not meet directly opposite each other, as in the previous supposition, but at an acute angle, and produce a belt of wind from east to west entirely around the earth, in the region of the equator. The continued action of this wind, on the surface of the water, would evidently give rise to a current of the ocean in the belt over which the wind passed. If, now, instead of considering the earth entirely covered with water, we suppose the existence of two continents, extending from north to south, forming barriers across the current we have described, and establishing two separate oceans, similar to the Atlantic and Pacific, then the continuous current to the west would be deflected right and left, or north and south, at the western shore of each ocean, and would form four immense whirlpools, namely, two in the Atlantic, one north and the other south of the equator, and two in the Pacific, similar in situation and direction of motion. The regularity of the outline of these whirls will be disturbed by the configuration of the deflecting coasts, and the form of the bottom of the sea, as well as by islands and irregular winds. For a like reason, a similar whirlpool will tend to be produced in the Indian ocean, the current from the east being deflected down the coast of Africa, and returning again, into itself, along a southern latitude on the western side of Australia. A fifth whirl exists in this ocean, and, in some seasons, is at times divided

into two, giving rise to the peculiar currents of this part of the earth's surface. Besides these great circular streams, the water supplied by all the rivers emptying into the Arctic basin, as well as that from all the precipitation in this region, return to the south, in a current between Europe and America, which as we shall hereafter see, has a very marked influence on the temperature of our coast. A similar current, but more diffuse and less in amount, must constantly flow from the Antarctic regions. In this view, we have adopted the hypothesis which ascribes the principal effect to the trade winds; a portion, however, will be due to the currents produced by the heating of the water itself. To illustrate the effect of these currents on the climate of the United States, let us consider those of the North Atlantic and North Pacific oceans, between which our continent is situated.

The great whirl, in the North Atlantic, the western and northern portions of which are known as the Gulf stream, passes southward down the coast of Africa, crosses the ocean in the region of the equator, is deflected from the northern portion of South America, and the coast of Mexico, along the United States, and recrosses the Atlantic at about the latitude of 40°, to return into itself at the place where it started. A portion, however, of this current, probably owing to the configuration of the bottom, passes off in a tangent to the circumference of the great whirl, and flows northward along the coasts of Ireland and Norway. By this current, the heated waters of the equator are carried northward, along the eastern coast of the United States, and precipitated upon the shores of Northern Europe, giving the temperature of a southern latitude even to North Cape, the extremity of Europe, which would otherwise be as cold as Greenland. This stream has less effect upon the climate of the United States than that upon the western coast of Europe; first, because the prevailing wind is from the west, and, secondly, because, between our shores and the Gulf stream, the cold polar current intervenes.

In the North Pacific ocean, on the western side of our continent, the great circle of water passes up along the coast of Japan, recrosses the ocean in the region of the Aleutian islands, mingles with the fitful current outward, through Bhering's strait, and thence down along the northwest coast of North America. In this long circuit, the north-eastern portion of it is much more cooled than the similar portion of the whirl of the Atlantic. It therefore modifies the temperature of the northwestern coast, and produces a remarkable uniformity along its whole extent, from Sitka to the southern extremity of California. It is an interesting fact, which we have just derived from Captain Rodgers, that an offshoot from the great whirl in the Pacific, analogous to that which impinges on the coast of Norway, enters along the eastern side of Bhering's strait, while a cold current passes out on the western side, thus producing almost as marked a difference in the character of the vegetation on the two shores of the strait, as between that of Ireland and Labrador.

The effect of prevailing currents of air, on the climate of different portions of the earth, is no less marked than proximity to the sea. We have seen that on one side of a line, over which the sun passes, a current of air flows from the north-east, and on the other from the

south-east, giving rise to the trade winds. These winds ascend obliquely, and, according to the views of Dove and others, rise to the upper regions of the atmosphere, flow backward towards the poles, and, partaking of the rotary motion of the earth, gradually turn to the eastward and approach its surface, producing a series of whirls overlapping each other entirely around the globe. Whatever may be the cause, however, of the phenomena, Professor Coffin, in his admirable paper on the winds of the northern hemisphere, has shown that, from the equator to the pole, the whole space is occupied by three great belts, or zones, of prevailing wind: the first extends from the equator to an average latitude of 35° north, in which the current is from the north-east, constantly growing less intense as we approach the northern limit; the second is that from 35° to about 60°, the current from the west being more intense in the middle of the belt, and gradually diminishing, almost into a calm, on either side; third, from 60° to the pole, or, rather, to a point of greatest cold in the Arctic regions, the wind is in a northeasterly direction.

The first of these belts would constitute what is called the trade winds, produced, as we have said, by the combined effects of the heat of the sun, and the rotation of the earth; the second, is the return trade, and the third, the current which would be produced by an opposite effect to that of the rarefaction of the air by the sun at the equator, namely, the condensation of the air by the cold portion of the earth. The air should flow out, in every direction, from the coldest point, and, combining its motion towards the south with the rotation of the earth, it should take a direction from the east to the west, or become a northeasterly wind.

The effects which these currents must have upon the climate of the United States will be made clear by a little reflection. The trade winds within the tropics, charged with vapor, impinging upon the mountainous parts of South America, in their course towards the west, will deposit their moisture on the eastern slope, and produce a rainless district on the western side. Again, a lower portion of the Atlantic and Gulf trade wind will be deflected from these mountains along the eastern coast of the United States, and through the valley of the Mississippi, as a surface wind, and thus give rise to the moist and warm breezes from the south, of our summers, while the principal or upper portion of the trade wind, or the return westerly current, sweeping over the Pacific ocean, and consequently charged with moisture, will impinge on the coast range of mountains of Oregon and California, and, in ascending its slopes, deposit moisture on the western declivity, giving fertility and a healthful climate to a narrow strip of country bordering on the ocean, and sterility to the eastern slope. All the moisture, however, will not be deposited in the passage over the first range, but a portion will be precipitated on the western side of the next, until it reaches the eastern elevated ridge of the Rocky mountain system, where, we think, it will be nearly, if not quite, exhausted. East of this ridge, and, as it were, in its shadow, there will exist a sterile belt, extending in a northerly and southerly direction, many hundred miles. The whole country, also, included between the eastern ridge of the Rocky mountains and the Pacific ocean, with the

exception of the narrow strip before mentioned, will be deficient in moisture, and on account of the heat, evolved, as before shown, by the condensation of moisture on the ridges, will be at a much higher temperature than that due to latitude. This mountain region, and the sterile belt east of it, occupy an area about equal to one-third of the whole surface of the United States, which, with our present knowledge of the laws of nature, and their application to economical purposes, must ever remain of little value to the husbandman.

According to this view, the whole valley of the Mississippi owes its fertility principally to the moisture which proceeds from the Gulf of Mexico, and the intertropical part of the Atlantic ocean. The Atlantic Gulf stream, therefore, as already remarked, produces very little effect in modifying the climate of the northern portion of the United States; first, on account of the cold polar current which intervenes between it and the shore; and secondly, because of the prevalent westerly wind, which carries the heat and moisture from us, and precipitates them on the coast of Europe.

The influence of the nature of the soil, on the climate of a country, may be inferred from its greater or less power to absorb and radiate heat, and from its capacity to absorb, or transmit over its surface, the water which may fall upon it in rain, or be deposited in dew. In the investigation of this part of the subject, the observations of the geologist, and the experiments of the chemist and the physicist, must be called into requisition.

In regard to the influence of *cultivation* on the climate of a country, much also may be said, though, at first sight, it might appear that man, with his feeble powers, could hope to have no influence in modifying the action of the great physical agents which determine the heat and moisture of any extended portions of the globe. But, though man cannot direct the winds, nor change the order of the seasons, he is enabled, by altering the conditions under which the forces of nature operate, materially to modify the results produced; for example, removing the forests from an extended portion of country exposes the ground to the immediate radiation of the sun, and increases, in many cases, the amount of evaporation; in other places, it bakes the earth, and allows the water to be carried off to the ocean, in freshets, and, in some instances, in destructive inundations.

Drying extensive marshes, or the introduction of a general system of drainage, has a remarkable influence in modifying the temperature. The water, which would evaporate, and, by the latent heat thus absorbed, would cool the ground, is suffered to pass through it to the drain beneath, and is thus carried off without depriving the earth of a large amount of heat, which would otherwise be lost. Besides this, the removal of forests gives greater scope to the winds, which are hence subjected to less friction in their passage over the earth.

The whole subject of the removal of forests is one which deserves more attention than it has usually received. In the progress of settlement, it is evident that a great portion of the wooded land of a new country must give place to the cleared field, in order that man may reap the rich harvest of the cereals, which, in his civilised condition, are necessaries, as well as luxuries, of life; yet the indiscrimi-

nate destruction of the forests is of doubtful propriety. By the judicious reservation of trees, along the boundaries of certain portions of land, in accordance with the known direction of the prevailing wind, the climate, both for the production of plants and animals, within a restricted portion of the earth, may be ameliorated. While, in some parts of the country, the clearing of nearly all the ground is absolutely necessary for agricultural purposes, in others, it may be profitable to allow forests of considerable extent to remain in their pristine condition. Cases of this kind, however, can only be determined by the particular climate of each district of country.

It is now an established truth, that certain locations are screened from miasmatic influence by the intervention of trees. A more general recognition of this fact might add much to the healthfulness of locations in other respects highly desirable.

The solar rays, in passing through the atmosphere, do not heat it in any considerable degree, but they heat the earth against which they impinge; therefore, the temperature of the lower stratum of air is derived, directly or indirectly, from the soil on which it rests; and this temperature, as has been remarked will depend upon whether the surface be marshy or dry, clothed with herbage, or covered with sand, clay, or an exposed rock. From this fact it is evident, that man has, in this particular also, considerable power in modifying the climate of portions of the earth; and history furnishes us with many examples in which great changes, within human control, have been produced in the course of ages. Nineveh and Babylon, once so celebrated for their advance in civilisation and opulence, and Palmyra and Balbec, for their magnificence, offer at this day to the traveller the site of ruins which attest their past greatness, in the midst of desolation. Canaan, described in the Bible as a fertile country, "flowing with milk and honey," is now nearly deprived of vegetation, and presents a scene of almost uninterrupted barrenness. The climate of these countries is undoubtedly modified by the present state of the surface, and might again be ameliorated by cultivation, and, were the encroachments of the sands of the desert stayed, by borders of vegetation of a proper character. Many parts, even of our own country, which now exhibit a surface of uninterrupted sand, may be rendered productive, or covered with trees and herbage.

A series of observations on the progress of temperature below the surface, in different parts of the country, and even in different fields of the same plantation, would be of value in ascertaining the proper time to introduce the seed, in order that it might not be subjected to decay by premature planting, or lose too much of the necessary influence of summer, by tardy exposure in the ground. This may, perhaps, be most simply effected, by burying a number of bottles filled with water, at different depths in the ground, say one at the depth of 6 inches, another at 12, and a third at 18 inches. These, in the course of time, would take the temperature of the earth in which they were embedded, and would retain it sufficiently long, unchanged, to admit of its measurement, by inserting a thermometer into the mouth of the bottle.

No improvement is more necessary, for rendering the art of agricul-

ture precise, than the introduction into its processes of the two essential principles of science, namely, those of weight and of measure. All the processes in our manufactories, on a great scale, which were formerly conducted by mere guesses, as to heat and quantities, are now subjected to rules, in which the measure of temperature, and the weight of materials, are definitely ascertained by reliable instruments.

The foregoing are general views as to the great principles which govern the peculiarities of climate, and especially that of the United States, the truth of which, in reference to our continent, and the modifications to which they are to be subjected, are to be settled by observations in the future.

In order, however, that the science of meteorology may be founded on reliable data, and attain that rank which its importance demands, it is necessary that extended systems of coöperation should be established. In regard to climate, no part of the world is isolated; that of the smallest island in the Pacific is governed by the general currents of the air and the waters of the ocean. To fully understand, therefore, the causes which influence the climate of any one country, or any one place, it will be necessary to study the conditions, as to heat, moisture, and the movements of the air, of all others. It is evident, also, that, as far as possible, one method should be adopted, and that instruments affording the same indications, under the same conditions, should be employed.

It is true that, for determining the general changes of temperature, and the great movements of the atmosphere of the globe, comparatively few stations of observation, of the first class, are required; but, these should be properly distributed, well furnished with instruments, and supplied with a sufficient corps of observers, to record, at all periods of the day, the prominent fluctuations. Such stations, however, can only be established and supported by the coöperation of a combination of governments.

A general plan of this kind, for observing the meteorological and magnetical changes, more extensively than had ever before been projected, was digested by the British Association, in 1838, in which the principal governments of Europe were induced to take an active part; and had that of the United States, and those of South America, joined in the enterprise, a series of watch-towers of nature would have been distributed over every part of the earth. The following were the stations of the several observatories established: Those of the English government were at Greenwich, Dublin, Toronto, St. Helena, Cape of Good Hope, Van Dieman's Land, Madras, Simla, Singapore, and Aden. The Russian observatories were at Boulowa, Helsingfors, Petersburg, Sitka, Catherinenburg, Kasan, Barnaoul, Nicolaieff, Nertschinsk, Tiflis, and Pekin. Those of Austria were at Prague and Milan. In the United States, an observatory was established at Girard College, under the direction of Professor Bache. The French government had one at Algiers; the Prussian government, one at Breslau; the Bavarian government, one at Munich; and the Belgian, one at Brussels. There was one at Cairo, supported by the Pasha of Egypt, and one in India, at Travandrum.

These observatories were established to carry out a series of obser-

vations, at the same moment of absolute time, every two hours, day and night, (Sunday excepted,) during three years, together with observations once every month, continuing 24 hours, at intervals of five minutes each. They were all furnished with standard instruments, and followed instructions adopted by the directors of the general system. Operations were commenced in 1839, and, in a number of cases, were continued through nine years. The number of separate observations amounted to nearly six millions, which required at least as much labor for their reduction as any expended in the observations themselves. The comparisons of these observations are still in progress, and will occupy the attention of the student of magnetism and meteorology, for many years to come. The system was established more particularly to study the changes of the magnetic needle, and on this subject alone, it has afforded information of sufficient importance to repay all the labor and time expended on it. It has shown that the magnetic force is scarcely constant from one moment to another, that the needle is almost incessantly in motion, that it is affected by the position of the sun and moon, and by perturbations, connected with meteorological phenomena, of a most extraordinary character.

In regard to meteorology, this system furnished reliable data for the great movements of the atmosphere, and the changes in its thermal and hygrometric condition. But, to obtain a more minute knowledge of the special climatology of different countries, it is necessary that a series of observations, at a great many places, should be continued through a number of years, and at stated periods of the day—not as frequent as those of the observations we have mentioned, but embracing as many elements, and even adding to these, as new facts may be developed, or new views entertained. In many countries, accordingly, provision has been made, by their respective governments, for continued though local systems of this kind. The government of Prussia appears to have taken the lead in this important labor, and its example has been followed by those of Great Britain, Russia, Austria, Bavaria, Belgium, Holland, and France. In these countries, regular and continuous observations are made, with reliable instruments, on well-digested plans.

Though the government of the United States took no part with the other nations of the earth, in the great system before described, yet it has established and supported for a number of years a partial system of observation at the different military posts of the army. Among other duties assigned to the surgeons, at the suggestion of Surgeon General Lovell, was that of keeping a diary of the weather, and of the diseases prevalent in their vicinity. The earliest register received, under this regulation, was in January, 1819. The only instruments at first used were a thermometer and wind-vane, to which, in 1836, a rain-gauge was added. The observations were made at 7 A. M. and 9 P. M., and the winds and weather were observed morning, noon and evening. It is to be regretted that, in 1841, the variable hour of sunrise was substituted for that of 7 A. M., since the latter admits of an hourly correction which cannot be applied to the former, except at the expense of too great an amount of labor.

The results of the observations for 1820 and 1821 were published at the end of each year; those from 1822 to 1825, inclusive, were issued in the form of a volume, by Surgeon General Lovell; those from 1826 to 1830, and from 1830 to 1842, inclusive, were prepared and published in two volumes, under the direction of the present Surgeon General, Dr. Thomas Lawson. At the commencement of 1843, an extension of the system was made, by the introduction of new instruments, and an additional observation to the number which had previously been recorded, each day, and hourly observations for twenty-four hours were directed to be taken at the equinoxes and solstices.

During the past year, a quarto volume has been published, which contains the results of the observations of the thermometer, direction and force of winds, clearness of sky, and fall of rain and snow, during a period of twelve years, from the first of January, 1843, to January, 1855, arranged in monthly tables and annual summaries. To these are added consolidated tables of temperature and rain, for each separate station, comprising the results of all the thermometric observations made by medical officers since 1822, and of all measurements of rain and snow, since the introduction of the rain-gauge, in 1836.

The tabular part of this volume contains the most important results of the observations of the Army system of registration, and will be considered the most valuable contribution yet made toward a knowledge of the climatology of the United States. Truth, however, will not permit us to express the same opinion in reference to the isothermal charts which accompany this volume. These we consider as premature publications, constructed from insufficient data, and on a principle of projection by which it is not possible to represent correctly the relative temperatures in mountainous regions.

With the learning and zeal for science possessed by the officers of the United States Army, and the importance which they attach to meteorology, in its connection with engineering and topography, it is hoped that this system may be farther extended and improved, that each station may be supplied with a compared thermometer and psychrometer, and that, at a few stations, a series of hourly observations may be established, for at least a single year. The present Secretary of War, we are assured, would willingly sanction any proposition for the improvement of this system, and we doubt not the Surgeon General is desirous of rendering it as perfect as the means at his disposal will permit.

A local system of meteorological observations was established in the State of New York, in 1825, and has been uninterruptedly continued from that time until the present. Each of the academies, which participated in the literature fund of the State, was furnished with a thermometer and rain-gauge, and directed to make three daily observations relative to the temperature, the direction of the wind, cloudiness, &c. The system was remodelled, in 1850, so as to conform to the directions of the Smithsonian Institution, and a considerable number of the academies were furnished with full sets of compared instruments, consisting of a barometer, thermometer, psychrometer, rain-gauge and wind-vane.

A summary of the results of the observations from 1826 to 1850, inclusive, has just been published by the State of New York, under the direction of the Regents of the University. They are presented in the form of a quarto volume, to which is prefixed a map of the State, showing the direction of the wind, and the position of each station. This volume, the computations for which were made by Dr. Franklin B. Hough, is also a valuable contribution to meteorology, and does much credit to the intelligence and perseverance of those who introduced and have advocated the continuance of this system, and to the liberality of the State which has so long and so generously supported it.

A system of State observations, in Pennsylvania, was established, in 1837. For this purpose, the legislature appropriated $4,000, which sum was placed at the joint disposal of a committee of the American Philosophical Society and the Franklin Institute. The results of this system have not yet been presented to the world, in a digested form.

Another State system was established in Massachusetts, in 1849, the records of which have been presented to the Smithsonian Institution, and will be published, in considerable detail, either at the expense of the State or of the Smithsonian fund.

A system of meteorological observations was established by the Smithsonian Institution, in 1849, the principal object of which was to study the storms that visit the United States, particularly during the winter months. This system, which has been continued up to the present time, was afterwards extended, with a view to collect the statistics necessary to ascertain the character of the climate of North America, to determine the average temperature of various portions of the country, and the variations from this at different periods of the year. It was intended to reduce, as far as possible, to one general plan, the several systems of observations which had previously been established, and to induce others to engage in the same enterprise. But it was, in the first place, desirable, in order that the results might be comparable with those obtained in other countries, that the instruments should be more accurate than those which might be requisite for the mere determination of the phenomena of storms. The institution, therefore, procured standard barometers and thermometers from London and Paris, and, with the aid of Professor Guyot, a distinguished meteorologist, copies of these were made, with improvements, by Mr. James Green, a scientific artist of New York. A large number of these instruments have been constructed and sold to observers. Full sets have been furnished by the Institution to parties in important positions, and, in some cases, half the cost has been paid at the expense of the Smithsonian fund.

A growing taste having been manifestly created for the study of practical meteorology, directions for observations, and a volume of tables for their reduction, have been prepared, and widely circulated at the expense of the Institution. It has also distributed blanks to all the observers of the different systems alluded to, except those of the Army, and has received, in return, copies of all the observations which have been made. It has, in this way, accumulated a large

amount of valuable material, relative to the climate of this country, and to the character of the storms to which it is subjected. The completeness and accuracy of the observations have also increased from year to year; and, by an arrangement which the Institution has now made with the Patent Office, it is hoped that the system will be extended, and its character improved.

It being manifest, from the foregoing statements, and from other evidences, that much interest is awakened in this country on the subject of meteorology, it is hoped that the means may be afforded for reducing and publishing the materials which have been and shall be accumulated, and that important results to agriculture, as well as to other arts, may be hence deduced.

DESCRIPTION OF THE TABLES.

The numbers given, in the accompanying meteorological tables, are mostly those indicating average or mean results. The principle of deducing general laws from a multiplicity of facts or observations, though liable in themselves to error, is of the greatest value in modern science. If we observe the temperature of a given place every hour in the day, add all the observations into one sum for a year, and divide by the number of hours in a year, we shall get the mean annual temperature. By this method of observation, we shall ascertain the warmest and the coolest hours of each day, and, by repeating the same process for a number of years, we shall learn the temperature of each hour, eliminated from all perturbations, and in this way arrive at truths which could not be obtained by any other means. If we examine the individual records, we shall find the warmest time to recur, on different days, at different hours. We know, however, that, if there were no perturbing influences, the warmest period of the day would be that at which the heat received from the sun is just equal to the cooling of the earth by radiation into space. At every instant, from the rising of the sun, previous to this, the earth would be receiving more heat than it gave off, and hence the temperature would constantly increase, until the heating and cooling were equal. After this, the earth would give off more heat than it would receive, and the temperature would begin to descend. On individual days, however, clouds may intervene, or winds of varying temperatures and velocities, may prevail, so as to change the hour of maximum heat; but, as these are not periodical and governed by recurring laws, the probability is that they will act in opposite directions; that is, on some days, hasten the maximum period, and on other days retard it, and thus, in the course of a year, or several years, neutralise each other. The method, therefore, of averages, enables us to separate the effects produced by irregular variations from those which are due to permanent causes. The latter are called periodic variations, while to the former has been given the name of non-periodic. By continuing the observations for a number of years, in ascertaining the temperature at a given place, we find, by the method we have explained, a result from which that of the individual years

will oscillate, on either side, within certain limits, while, for two separate decades of years, it will scarcely differ at all; and this is the mean temperature of the place. The same statement may be made in regard to the other elements of meteorology, and the result of all the observations may be divided into two great classes, periodical and non-periodical, though, by a very long series of observations, it may happen that a phenomenon, which at first may appear entirely fitful, will afterwards prove to be recurring; and, at all events, the non-periodic variations are found to be restricted within definite limits, the maximum amount of which it is highly necessary to obtain.

The first element given in the tables is that of the mean height of the barometer, from month to month. This is, perhaps, less immediately essential to the agriculturist than any other meteorological element. It is, however, of much importance, in determining the progress of storms, and the area over which the commotions of the atmosphere, connected with them, are perceptible, though no violent disturbances may be observed. For example, if the barometer, on a given day, is higher or lower than the average for the month, we are then convinced that it is subjected to some unusual perturbation; and, by drawing a line on a map through all the places at which a given amount of disturbance is felt, at a particular time, we are enabled to trace the boundary of a storm, and to indicate its progress, development, and end. For this purpose, it is not necessary, even that the barometers should be strictly comparable with each other; it is only necessary that the results should be comparable among themselves. When the barometers have been accurately compared with each other, as, for instance, those of Green, of New York, constructed under the direction of the Smithsonian Institution, they afford the data for determining the relative elevation of different places of observation above the level of the sea.

The indications of the barometer, compared with those of the hygrometer, thermometer, and wind-vane, furnish us with a method of predicting changes in the weather. These, however, in many cases, will be found to depend upon rules applicable to particular places, and which can only be determined by a long series of local observations.

The next element given in the tables is the mean monthly temperature. By comparing this with the average deduced from a number of years' observations, we are enabled to ascertain the variations of each month from the normal temperature of the same month, as deduced from a series of years, and to compare the temperature of the "growing" portions of different years with each other. When experiments shall have been made upon the amount and distribution of heat, necessary to give the best development to particular plants, by a table of this kind, we are enabled to select the months best suited to their cultivation. Moreover, each plant requires a certain amount of heat for its proper growth, though this amount may vary considerably in intensity; for example, a comparatively low degree of heat may be compensated by its longer continuance. This rule, however, is confined within certain limits; for, if the temperature rises above a given degree, or falls below a particular point, the vi-

tality of the plant may be destroyed. By a well-conducted series of experiments and observations, the agriculturist may be enabled to determine, without a ruinous series of actual trials, what plant may, on the principle of assurance, be safely cultivated in a given place.

Besides the mean temperature, the extremes are also given, and these are of essential importance in determining the variations of temperature to which the plant is to be subjected. The length of the growing summer in a given year, and in a particular place, may, for instance, be measured by the interval which occurs between two killing frosts.

The next element in order, presented in the accompanying tables, is that of the moisture; and this is of much importance in judging of the productiveness of different years and different places. Unfortunately, however, comparatively few observations are regularly made on the variations of moisture in the atmosphere, in the United States. It is to be hoped that our returns for another year will indicate an increased number of the stations where valuable observations of this kind are taken. The figures in the tables do not indicate the actual amount of water, for example, in a cubic foot of air, but the fractional part of the whole amount necessary to produce entire saturation; thus, if saturation is represented by 100, 57 indicates that this number of parts of water is contained in the air, or that it is a little more than half saturated. We are obliged to adopt this method of representation, because the relative moisture and dryness of the air depend upon the temperature, and not on the absolute quantity, of vapor present. Thus, air at 32°, which contains as much water as it can hold, or, in other words, is saturated, would, by heating, become exceedingly dry, though containing absolutely the same amount of water. The relative dryness is indicated by the complement of the numbers in the table, and consequently may be found by subtracting these numbers from 100. The state of our feelings is much more affected by the moisture of the atmosphere than by the temperature, and the sensation called "closeness" is principally due to the great amount of humidity, or, in other words, to the diminution of the dryness of the air, which prevents evaporation from the surface of the body, and its attendant cooling effects. A series of observations on the relative humidity, in the regions west of the Mississippi, and the northern portions of the middle part of our continent, in connexion with the different winds, would be highly interesting, in determining the source of the vapor in these regions, as well as settling definitely the fact in regard to their average productiveness.

Another element, intimately connected with the moisture in the air, is, the amount of rain and snow, particularly the former. Besides the whole amount which falls during a year, it is necessary to know the relative quantity which falls in different months. A large amount of rain may fall at once, and a greater relative proportion of it will, before the earth can have time to be fully saturated, be carried off, through the streams of creeks and rivers, and thus do much less, in the way of fertilising the earth, than if the same amount were distributed over a longer period.

The indications of the rain, as of the other elements, would be more interesting, could they be compared with the average amount deduced from a series of observations made through a number of years.

The direction of the wind, as well as the amount of cloudiness and sunshine, besides being of much importance in determining the meteorological elements of the climate of a country, are of interest to the farmer, in comparing them with the other elements with which it is intimately connected, and thus deducing rules for the prognostication of the weather.

Summary of Meteorological Observations, made at ALEXANDRIA, Virginia; Latitude, 38° 49′ N.; Longitude, 77° 4′ W. from Greenwich; Elevation above tide water, 56 feet. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observer, BENJAMIN HALLOWELL.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual.
Barometer, mean inches.	30.15	30.07	29.98	29.97	29.96	29.95	30.02	30.02	30.10	30.11	29.93	30.02	30.02
Barometer, extremes....	30.59	30.58	30.47	30.62	30.26	30.24	30.20	30.25	30.52	30.49	30.53	30.64	
	29.36	29.52	29.36	29.39	29.74	29.59	29.86	29.80	29.53	29.50	29.33	29.44	
Thermometer, mean.....	35.74	37.97	46.10	51.87	67.05	74.37	80.83	78.17	71.30	57.33	44.72	32.19	56.47
Thermometer, extremes	57.23	59.67	68.17	70.00	76.50	86.80	89.80	90.30	87.70	73.33	60.50	45.00	
	21.83	22.17	31.00	33.00	50.17	61.20	69.00	65.30	52.00	39.66	28.31	19.00	
Psychrometer, mean.....	73.00	81.00	66.00	70.00	65.00	65.00	75.00	.....	.....	76.00	74.00	79.00	
Psychrometer, extremes.	100.00	100.00	100.00	100.00	91.00	96.00	100.00	.....	.....	100.00	100.00	100.00	
	51.00	50.00	20.00	00.00	23.00	39.00	23.00	.....	.....	33.00	28.00	00.00	
1855.													
Barometer, mean inches..	30.09	29.99	29.95	30.02	29.97	29.91	30.00	30.04	30.10	30.00	30.11	30.09	30.02
Barometer, extremes...	30.80	30.33	30.47	30.36	30.25	30.20	30.28	30.35	30.35	30.30	30.43	30.68	
	29.33	29.57	29.36	29.43	29.61	29.57	29.80	29.73	29.76	29.63	29.47	29.15	
Thermometer, mean.....	34.94	26.69	39.17	54.87	64.10	71.20	77.82	73.80	69.09	51.89	48.23	37.47	54.11
Thermometer, extremes.	50.67	46.00	55.30	77.70	77.70	87.33	86.33	80.00	82.00	65.67	62.33	55.67	
	23.67	14.00	25.00	36.00	48.00	58.33	64.33	63.00	55.00	38.00	35.00	19.00	
Psychrometer, mean.....	82.00	81.00	77.00	76.00	68.00	79.00	80.00	83.00	85.00	86.00	88.00	86.00	81.00
Psychrometer, extremes.	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	
	00.00	26.00	30.00	18.00	32.00	42.00	53.00	53.00	63.00	57.00	55.00	06.00	

Summary of Meteorological Observations, made near ANN ARBOR, Michigan; Latitude, 42° 15′ N.; Longitude 83° 30′ W. from Greenwich. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observer, L. WOODRUFF.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual.
Thermometer, mean.....	21.40	25.86	35.63	46.99	58.73	68.47	75.10	73.90	65.97	56.47	36.32	24.97	49.15
Thermometer, extremes.	43.35	42.67	54.00	65.33	69.33	85.09	85.30	86.60	84.30	69.60	47.00	38.33	
	00.00	04.33	19.67	28.67	45.33	55.60	62.00	61.00	49.00	38.30	22.66	00.33	
1855.													
Thermometer, mean.....	25.70	16.18	29.80	50.53	59.27	63.07	70.86	67.82	64.11	45.77	39.45	25.59	47.51
Thermometer, extremes	56.00	36.67	44.00	74.00	75.30	81.33	82.00	78.00	77.67	58.33	58.00	46.33	
	04.67	05.67	16.30	24.60	36.70	44.67	64.00	54.67	49.67	32.00	23.33	04.17	

Summary of Meteorological Observations, made at AMHERST, Massachusetts; Latitude, 42° 22′ 15″ 6 N.; Longitude, 72° 31′ 28″. W. from Greenwich; Elevation above tide-water, 267 feet. Hours of observation, 7 A. M., and at 2 and 9 P. M.

Observer, Professor, C. S. SNELL.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Barometer, mean inches,	29.81	29.80	29.66	29.73	29.69	29.67	29.76	29.76	29.84	29.83	29.60	29.68	29.74
Barometer, extremes....	30.39	30.43	30.12	30.38	30.11	29.98	29.99	30.11	30.24	30.24	30.37	30.53	
	29.18	29.17	28.89	29.25	29.34	29.37	29.49	29.49	29.40	29.16	28.92	28 69	
Thermometer, mean.....	22.36	21.97	30.47	43.07	57.27	66.80	74.23	68.80	63.27	51.51	39.82	22.23	46.81
Thermometer, extremes.	40.23	38.67	52.00	59.60	69.33	76.70	85.10	78.90	77.80	66.00	60.27	38.30	
	03.20	04.63	19.47	30.00	37.80	53.80	65.70	60.70	43.80	37.20	22.67	02.33	
Psychrometer, mean	85.00	71.00	81.00	73.00	74.00	80.00	77.00	71.00	83.00	84.00	86.00	91.00	80.00
Psychrometer, extremes.	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	
	51.00	54.00	19.00	19.00	36.00	37.00	31.00	21.00	40.00	43.00	41.00	36.00	
1855.													
Barometer, mean inches..	29.83	29.66	29.62	29.74	29.69	29.64	29.77	29.82	29.85	29.66	29.81	29.82	29.74
Barometer, extremes....	30.66	30.15	30.14	30.06	30.04	29.95	30.09	30.15	30.18	30.12	30.22	30.38	
	28.76	29.29	29.04	28.80	29.30	29.13	29.50	29.23	29.40	29.22	29.13	28.64	
Thermometer, mean.....	27.72	19.88	31.53	43.83	56.63	64.84	71.22	65.75	60.19	49.61	38.49	28.12	46.48
Thermometer, extremes.	41.33	38.33	44.20	62.00	70.30	84.67	81.67	74.07	74.90	65.33	53.70	40.50	
	11.90	08.00	19.00	22.30	40.80	53.67	58.33	53.57	45.90	38.67	25.20	09.00	
Psychrometer, mean.....	90.00	90.00	79.00	78.00	65.00	80.00	86.00	81.00	80.00	86.00	81.00	84.00	82.00
Psychrometer, extremes.	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	
	54.00	50.00	33.00	26.00	22.00	36.00	48.00	31.00	45.00	42.00	43.00	41.00	

Summary of Meteorological Observations, made at AUGUSTA, Illinois; Latitude, 40° 12′ N.; Longitude, 90° 45′ W. from Greenwich. Hours of observation, 7 A. M., and at 2 and 9, P. M.

Observer, Dr. S. B. MEAD.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Thermometer, mean.....	21.03	33.37	42.48	54.32	62.93	71.57	76.67	77.27	70.77	57.51	39.53	30.93	53.20
Thermometer, extremes.	51.00	55.33	66.67	75.00	72.00	84.00	88.30	83.30	86.00	71.33	56.00	47.00	
	00.66	10.33	26.67	26.33	47.67	53.30	68.00	66.30	53.00	41.33	23.33	15.00	
1855.													
Thermometer, mean.....	26.96	21.09	33.77	58.17	62.83	69.33	75.62	70.78	69.37	53.07	42.17	24.00	50.60
Thermometer, extremes.	60.00	42.33	53.00	79.70	84.00	82.67	83.67	85.33	80.00	67.00	59.33	51.67	
	02.00	01.67	12.30	36.00	48.00	44.33	67.67	58.33	53.33	33.00	22.67	06.00	

Summary of Meteorological Observations, made at ATHENS, Illinois; Latitude, 39° 52′ N.; Longitude, 89° 56′. W. from Greenwich. Hours of observation, 7 A. M., and at 2 and 9 P. M.

Observer, JOEL HALL.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Thermometer, mean.....	23.01	34.63	44.00	55.47	66.32	72.80	79 80	79,30	73.57	59.71	41.06	32.97	55.22
Thermometer, extremes.	51.33	56.33	67.00	77.67	78.00	85.70	99.00	88.70	85.30	74.33	58.33	51.67	
	00.03	17.66	29.00	27.67	50.67	52.70	70.60	66.30	57.00	44.33	25.33	15.67	
1855.													
Thermometer, mean.....	28.36	22.41	35.23	60.30	64.90	69.94	78.97	75.57	72.31	52.21	44.11	26.76	52.59
Thermometer, extremes.	59.67	43.67	56.00	81.70	85.00	84.67	89.33	87.33	81.67	68.33	63.00	52.67	
	03.33	02.33	15.70	36.00	46.00	52.33	70.00	62.00	58.00	35.00	25.00	07.00	

Summary of Meteorological Observations, made at BALDWINSVILLE, New York; Latitude, 43° 4′ N.; Longitude, 76° 41′ W. from Greenwich. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observer, JOHN BOWMAN.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Thermometer, mean.....	24.10	21.90	32.28	41.42	56.17	66.20	72.40	67.90	61.53	51.72	37.27	23.75	46.39
Thermometer, extremes.	44.33	37.67	48.33	58.00	68.33	76.30	81.00	78.00	79.00	63.20	51.66	38.33	
	04.00	8.67	17.67	26.00	33.67	55.00	64.60	58.70	45.00	36.20	25.00	7.00	
1855.													
Thermometer, mean.....	26.57	16.80	29.10	43.07	54.20	61.24	69.31	65.68	60.12	47.53	39.82	28.57	45.17
Thermometer, extremes.	42.00	33.67	43.00	63.30	70.70	81.00	79.33	73.67	76.67	61.00	54.33	43.67	
	6.67	16.67	13.30	20.00	38.70	47.33	59.00	54.33	44.00	34.33	22.67	8.67	

Summary of Meteorological Observations, made at AUSTIN, Texas; Latitude, 30° 20′ N.; Longitude, 97° 46′ W. from Greenwich. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observer, Dr. S. K. JENNINGS.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Thermometer, mean.....	47.45	54.47	65.41	66.88	72.86	78.53	80.50	81.93	77.83	70.77	57.22	46.68	66.71
Thermometer, extremes.	69.66	68.33	76.33	78.67	83.00	86.70	83.60	84.70	83.70	78.60	68.66	60.00	
	23.33	35.33	48.00	51.00	64.33	71.00	75.30	75.00	68.70	62.00	40.00	28.33	
Psychrometer, mean.....	75.00	72.00	73.00	53.00	74.00	67.00	65.00	66.00	73.00	74.00	77.00	78.00	70.00
Psychrometer, extremes.	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	
	24.00	23.00	25.00	13.00	22.00	31.00	31.00	31.00	29.00	33.00	10.00	16.00	
1855.													
Thermometer, mean.....	49.38	47.94	56.80	71.13	77.23	78.14	80.11	80.80	78.13	63.69	58.89	54.47	66.39
Thermometer, extremes.	64.33	64.67	77.00	77.70	83.00	83.33	83.00	87.33	82.33	76.00	76.67	70.00	
	26.67	28.67	40.00	53.30	68.00	69.00	74.00	73.33	70.00	44.67	45.33	17.33	
Psychrometer, mean.....	70.00	76.00	68.00	68.00	66.00	65.00	65.00	65.00	72.00	74.00	72.00	75.00	80.00
Psychrometer, extremes.	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	
	0.00	18.00	0.00	22.00	27.00	31.00	31.00	27.00	37.00	12.00	0.00	7.00	

Summary of Meteorological Observations, made at BELOIT, Wisconsin, Latitude 42° 30′ N.; Longitude, 89° 4′ W. from Greenwich; Elevation above tide water, 750 feet. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observers, S. P. LATHROP, Professor W. PORTER, and others.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Barometer, mean inches...	29.20	29.19	29.12	29.12	29.03	29.11	29.20	29.21	29.24	29.26	29.02	29.19	29.16
Barometer, extremes.	29.76	29.66	29.99	29.68	29.37	29.49	29.41	29.41	29.66	29.63	29.83	29.48	
	28.60	28.61	28.59	28.61	28.35	28.83	28.96	29.05	28.93	28.52	28.40	28.52	
Thermometer, mean.....	15.12	26.29	39.67	50.03	60 87	70.40	76.60	74.03	65.77	53.70	34.28	24.38	49.26
Thermometer, extremes.	38.33	44.35	55.00	71.00	74.00	86.00	87.00	89.70	84.30	64.00	50.33	37.33	
	9.00	5.36	23.33	28.00	45.00	46.70	65.30	62.00	48.00	38.33	20.00	10.00	
1855.													
Barometer, mean inches...	29.16	29.23	29.11	29.18	29.20	29.09	29.16	29.22	29.24	29.18	29.20	29.19	29.18
Barometer, extremes.	29.81	29.68	29.62	29.66	29.53	29.44	29.32	29.54	29.39	29.45	29.63	29.69	
	28.64	28.66	28.37	28.87	28.78	28.65	28.83	28.93	29.00	28.80	28.60	28.29	
Thermometer, mean.....	22.64	13.98	28.17	50.43	60.03	65.19	72.27	68.79	66.42	45.16	38.51	22.07	45.89
Thermometer, extremes.	51.67	35.00	41.70	74.00	81.00	80.33	87.00	81.33	76.33	63.67	60.00	50.67	
	2.33	3.33	8.30	26.30	39.00	48.33	60.00	56.67	48.67	30.67	21.33	9.33	

Summary of Meteorological Observations, made at BATTLE CREEK, Michigan, Latitude 42° 20′ N.; Longitude 85° 1′ W. from Greenwich. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observer, Dr. W. M. CAMPBELL.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Thermometer, mean.	22.32	26.11	35.97	47.27	56.17	71.03	78.90	74.07	68.53	55.06	38.30	26.82	50 43
Thermometer, extremes.	44.66	40.67	55.67	71.33	76.00	87.30	90.00	87.70	88.30	67.20	52.33	39.53	
	1.00	8.67	20.00	27.33	43.00	53.00	63.00	61.70	53.30	40.20	27.00	9.00	
1855.													
Thermometer, mean.....	25.84	18.92	31.40	51.40	60.90	66.14	73.61	70.47	66.50	47.52	41.52	27.05	48.44
Thermometer, extremes.	52.67	40.33	47.00	72.70	77.30	86.00	87.33	82.67	81.00	63.67	59.67	51.00	
	6.33	2.00	12.30	25.00	38.30	48.33	63.67	59.00	52.67	32.00	27.00	8.67	

Summary of Meteorological Observations, made at BRANDON, Vermont, Latitude 43° 45′ N.; Longitude 73° 8′ W. from Greenwich. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observer, DAVID BUCKLAND.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Thermometer, mean.....	20.78	17.92	29.12	39.02	57.64	63.73	72.87	67.20	59.47	50.98	37.01	17.77	44.46
Thermometer, extremes.	45.50	36.00	48.00	55.60	70.67	72.50	82.90	78.20	79.00	67.00	55.67	38.00	
	5.67	5.60	14.13	23.00	28.67	58.00	64.30	60.30	47.30	39.00	19.84	11.00	
1855.													
Thermometer, mean.....	25.63	17.53	27.80	42.70	55.63	62.72	70.70	65.35	58.62	47.47	35.06	26.04	44.60
Thermometer, extremes.	43.00	36.33	46.70	60.30	71.70	83.16	89.34	75.00	75.67	68.33	52.67	41.33	
	1.50	17.83	14.00	18.00	44.30	51.00	59.83	52.00	42.17	35.00	17.00	1.50	

Summary of Meteorological Observations made at BLOOMFIELD, New Jersey; Latitude 40° 49′ N.; Longitude 74° 11′ W. from Greenwich; Elevation above tide-water 120 feet. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observer, ROBERT L. COOK.

1855.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Barometer, mean inches..	29.94	29.90	29.80	29.87	29.81	29.79	29.88	29.86	29.95	29.94	29.72	29.85	29.86
Barometer, extremes....	30.44	30.42	30.21	30.52	30.21	30.11	30.05	30.17	30.39	30.32	30.35	30.61	
	29.00	29.34	29.20	29.39	29.40	29.49	29.70	29.57	29.50	29.29	29.01	28.91	
Thermometer, mean.....	28.92	29.93	37.48	46.72	61.54	68.83	75.90	72.53	66.23	55.65	43.05	27.71	51.15
Thermometer, extremes.	49.00	45.00	62.67	61.00	70.50	77.30	87.00	85.20	84.70	70.00	62.50	41.33	
	14.66	16.00	20.17	29.33	45.67	57.30	60-30	60.50	47.50	41.50	27.00	8.17	
Psychrometer, mean.....	76.00	75.00	68.00	72.00	73.00	80.00	76.00	72.00	77.00	81.00	73.00	78.00	75.00
Psychrometer, extremes.	100.00	100.00	96.00	100.00	97.00	100.00	100.00	98.00	97.00	100.00	98.00	100.00	
	40.00	34.00	23.00	49.00	25.00	28.00	40.00	33.00	30.00	39.00	39.00	28.00	
1855.													
Barometer, mean inches..	29.91	29.76	29.74	29.85	29.80	29.73	29.84	29.92	29.95	29.76	29.93	29.90	29.84
Barometer, extremes....	30.66	30.21	30.22	30.19	30.13	30.02	30.15	30.38	30.23	30.22	30.29	30.40	
	28.95	29.40	29.22	29.05	29.43	29.30	29.60	29.35	29.55	29.27	29.36	29.04	
Thermometer, mean.....	31.90	23.69	35.47	46.57	59.23	67.13	75.21	69.48	64.77	51.65	45.07	36.77	50.58
Thermometer, extremes.	44.16	37.17	46.50	68.00	73.30	83.33	86.50	78.33	80.67	67.83	56.83	47.67	
	16.17	2.67	24.20	31.80	40.00	57.83	63.66	57.00	52.50	43.00	30.16	28.33	
Psychrometer, mean.....	80.00	74.00	66.00	70.00	66.00	77.00	81.00	77.00	77.00	77.00	73.00	71.00	74.00
Psychrometer, extremes.	100.00	95.00	95.00	97.00	97.00	97.00	98.00	98.00	100.00	97.00	97.00	96.00	
	42.00	17.00	22.00	12.00	22.00	35.00	42.00	32.00	34.00	17.00	37.00	25.00	

Summary of Meteorological Observations, made at BURLINGTON, Vermont, Latitude 44° 29′ N.; Longitude 73° 11′ W. from Greenwich; Elevation above tide-water 346 feet. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observer, Professor Z. THOMPSON.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual.
Barometer, mean inches..	29.61	29.79	29.44	29.69	29.55	29.55	29.61	29.60	29.67	29.67	29.44	29.55	29.59
Barometer, extremes...	30.28	30.29	29.98	30.17	29.93	29.92	29.87	29.90	30.08	30.06	30.17	30.35	
	28.73	29.06	28.73	29.13	29.21	29.35	29.32	29.27	29.13	29.00	28.74	28.73	
Thermometer, moan.....	19.59	16.55	30.53	40.04	60.04	66.10	76.27	71.83	61.10	51.54	37.68	18.88	45.85
Thermometer, extremes	41.66	41.67	47.00	54.00	72.67	73.70	85.00	79.00	81.70	67.67	56.67	38.67	
	7.33	3.67	14.00	27.00	38.67	55.30	67.30	61.00	43.30	41.33	20.00	14.33	
Psychrometer, mean.....	60.00	55.00	63.00	61.00	62.00	69.00	65.00	56.00	69.00	70.00	68.00	60.00	63.00
Psychrometer, extremes.	100.00	100.00	90.00	100.00	91.00	100.00	86.00	89.00	94.00	100.00	100.00	100.00	
	0.00	0.00	8.00	9.00	26.00	27.00	35.00	18.00	36.00	29.00	41.00	0.00	
1855.													
Barometer, mean inches..	29.67	29.56	29.49	29.59	29.62	29.49	29.66	29.69	29.75	29.56	29.71	29.65	29.62
Barometer, extremes....	30.49	30.01	30.07	29.94	29.92	29.88	29.91	30.05	30.07	30.03	30.13	30.21	
	28.65	29.15	28.77	28.80	29.23	29.05	29.32	29.10	29.32	29.07	29 97	28.56	
Thermometer, mean.. ...	25.08	15.61	28.40	43.63	57.30	64.56	72.46	66.79	60.62	49.45	38.39	26.93	45.68
Thermometer, extremes	43.33	38.33	43.70	65.00	74.30	84.60	82.33	77.00	77.67	66.67	52.67	45.33	
	0.67	19.00	12.70	17.00	46.00	54.67	64.67	53.33	43.33	35.00	17.00	0.67	
Psychrometer, mean.....	66.00	57.00	62.00	59.00	51.00	72.00	74.00	73.00	73.00	70.00	70.00	59.00	66.00
Psychrometer, extremes.	90.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	
	0.00	0.00	4.00	9.00	23.00	35.00	42.00	38.00	43.00	19.00	37.00	0.00	

Summary of Meteorological Observations, made at BURLINGTON, New Jersey; Latitude, 40° N.; Longitude, 75° 12′ W. from Greenwich; Elevation above tide-water, 26 feet. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observer, Rev. A. FROST.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual.
Barometer, mean inches..	30.13	30.18	29.93	29.85	29.91	29.76	29.81	29.84	29.91	30.04	29.89	30.00	29.94
Barometer, extremes...	30.58	30.50	30.35	30.60	30.26	30.05	30.02	30.17	30.33	30.40	30.50	30.70	
	29.50	29.60	29.30	29.50	29.67	29.45	29.64	29.57	29.59	29.58	29.25	29.20	
Thermometer, mean.....	30.36	32.25	39.73	50.10	63.50	71.10	76.87	72.90	68.03	57.56	44.42	29.76	53.05
Thermometer, extremes	55.33	46.00	60.00	72.00	73.00	79.70	87.00	82.70	86.30	72.00	63.00	40.33	
	17.33	20.00	23.33	32.67	48.00	56.30	70.00	62.70	50.70	39.33	30.33	10.00	
1855.													
Barometer, mean inches..	30.10	29.98	29.94	29.97	29.89	29.89	29.98	30.04	30.08	29.92	30.07	30.04	29.99
Barometer, extremes...	30.78	30.31	30.47	30.32	30.16	30.15	30.23	30.33	30.32	30.24	30.35	30.54	
	29.27	29.64	29.46	29.34	29.59	29.60	29.80	29.59	29.70	29.50	29.50	29.10	
Thermometer, mean.....	33.40	25.65	38.50	51.13	61.67	70.50	76.72	71.60	67.10	54.42	45.79	34.38	52.57
Thermometer, extremes	48.33	47.00	51.30	69.30	77.70	86.93	87.33	80.67	82.00	72.00	60.33	54.33	
	21.33	3.67	23.70	32.70	43.00	60.00	63.67	62.67	53.33	39.00	31.33	16.00	

Summary of Meteorological Observations, made at CANTON, New York; Latitude, 44° 38′ N.; Longitude. 76° 15′ W. from Greenwich; Elevation above tide-water, 304 feet. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observer, E. W. JOHNSON.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual.
Barometer, mean inches..	29.46	29.52	29.33	29.45	29.40	29.38	29.47	29.43	29.52	29.47	29 24	29.40	29.42
Barometer, extremes...	30.10	30.07	29.82	29.98	29.78	29.73	29.71	29.66	29.92	29.89	30.00	30.15	
	28.55	28.86	28.26	28.91	29.13	29·07	29.20	29.12	29.08	28.65	28.53	28.73	
Thermometer, mean.....	16.47	15.38	28.31	40.21	59.03	67.00	75.67	70.70	61.13	51.10	37.00	15.97	44.83
Thermometer, extremes	46.67	36.67	48.00	56.30	78.67	78.30	85.30	80.70	83.30	66.70	51.00	40.33	
	12.67	7.00	12.67	24.00	29.67	54.70	68.00	57.70	44.00	30.70	14.00	17.33	
1855.													
Barometer, mean inches..	29.43	29.39	29.26	29.40	29.43	29.30	29.43	29.45	29.52	29.33	29.45	29.37	29.40
Barometer, extremes....	30.27	29.87	29.91	29.81	29.70	29.66	29.66	29.83	29.82	29.79	29.89	29.94	
	28.56	28.97	28.63	28.85	29.13	28.82	29.17	28.85	29.08	28.86	28.70	28.33	
Thermometer, mean.....	23.34	12.42	26.27	42.67	58.30	63.30	72.45	67.23	59.65	48.17	35.17	25.46	44.62
Thermometer, extremes	48.00	34.33	46.00	63.00	77.30	81.67	89.33	80.67	78.33	64.67	51.33	45.33	
	6.67	27.00	6.70	18.00	44.30	50.67	62.00	52.00	41.00	33.00	14.33	7.33	

Summary of Meteorological Observations, made at CAMDEN, South Carolina; Latitude, 34° 17′ N.; Longitude, 80° 33′ W. from Greenwich; Elevation above tide-water, 275 feet. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observers, THORNTON CARPENTER, J. A. YOUNG.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual.
Barometer, mean inches..	30.01	29.95	29.87	29.83	29.81	29.79	29.89	29.87	29.99	29.96	29.85	29.92	29.86
Barometer, extremes....	30.48	30.32	30.27	30.38	30.05	29.94	30.02	29.98	30.24	30.29	30.20	30.35	
	29.36	29.41	29.44	29.39	29.60	29.56	29.78	29.73	29.37	29.53	29.23	29.50	
Thermometer, mean.....	46.31	49.84	61.27	60.83	72.97	78.23	82.47	79.43	75.77	62.31	48.79	40.92	63.96
Thermometer, extremes.	45.16	66.76	78.90	77.20	81.47	93.00	87.30	86.80	84.00	76.34	66.33	58.33	
	32.67	38.43	44.77	41.60	63.47	63.00	74.50	73.00	62.00	49.67	33.00	28.33	
Psychrometer, mean.....	75.00	70.00	66.00	69.00	69.00	70.00	73.00	77.00	81.00	73.00	71.00	70.00	72.00
Psychrometer, extremes.	100.00	100.00	100.00	100.00	100.00	100.00	95.00	100.00	100.00	100.00	100.00	100.00	
	25.00	0.00	20.00	20.00	24.00	28.00	43.00	40.00	42.00	26.00	23.00	19.00	
1855.													
Barometer, mean inches..	29.96	29.88	29.86	29.93	29.85	29.83	29.90	29.88	29.93	29.85	29.93	29.97	29.90
Barometer, extremes....	30.49	30.19	30.29	30.19	30.10	30.12	30.10	30.11	30.16	30.19	30.23	30.47	
	29.33	29.41	29.42	29.54	29.53	29.53	29.71	29.64	29.68	29.48	29.41	29.33	
Thermometer, mean.....	45.42	41.16	52.27	65.87	71.60	75.62	81.55	79.84	77.12	59.40	57.71	45.95	62.79
Thermometer, extremes	60.33	54.33	72.60	86.70	83.30	83.67	85.33	85.33	84.33	74.67	70.67	66.33	
	29.67	28.00	31.30	48.00	59.70	64.67	75.60	66.67	65.67	43.00	40.33	30.67	
Psychrometer, mean.....	75.00	67.00	63.00	60.00	64.00	70.00	72.00	75.00	74.00	71.00	74.00	70.00	70.00
Psychrometer, extremes.	100.00	100.00	100.00	94.00	100.00	100.00	95.00	95.00	95.00	100.00	94.00	100.00	
	31.00	10.00	11.00	19.00	31.00	32.00	44.00	43.00	44.00	27.00	18.00	34.00	

Summary of Meteorological Observations, made at CEDAR KEYS, Florida; Latitude, 29° 8′ N.; Longitude, 83° 3′ W. from Greenwich. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observer, JUDGE A. STEELE.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual.
Thermometer, mean.....	58.64	60.72	69.07	67.28	78.07	82.00	84.37	82.90	82.03	73.69	58.67	54.96	71.03
Thermometer, extremes.	69.33	69.00	73.67	75.67	82.00	87.00	88.00	88.30	85.70	79.60	72.33	64.67	
	46.66	48.00	58.67	52.33	68.33	70.30	79.70	76.00	76.70	71.33	47.00	41.33	
1855.													
Barometer, mean inches..	29.97	29.92	29.90	29.96	29.85	29.92	29.93	29.89	29.90	29.88	29.89	29.93	29.91
Barometer, extremes....	30.30	30.22	30.23	30.13	30.01	30.04	30.05	30.03	30.04	30.09	30.07	30.30	
	29.52	29.68	29.66	29.65	29.67	29.83	29.84	29.79	29.79	29.69	29.58	28.91	
Thermometer, mean.....	57.44	52.13	59.90	69.40	74.93	80.75	80.54	82.07	80.62	69.11	69.48	60.99	69.78
Thermometer, extremes.	66.00	62.00	71.30	75.00	82.50	83.33	83.33	85.00	84.00	80.67	76.33	67.67	
	40.67	40.00	42.70	59.00	68.30	77.00	76.33	74.23	76.33	49.33	54.33	49.67	

Summary of Meteorological Observations, made at CARMEL, Maine; Latitude, 44° 47′ N.; Longitude, 69° W. from Greenwich; Elevation above tide water, 175 feet. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observer, JOHN J. BELL.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Barometer, mean inches..	29.64	29.68	29.55	29.60	29.62	29.50	29.60	29.65	29.67	29.75	29.48	29.54	29.61
Barometer, extremes....	30.28	30.37	30.09	30.20	30.36	29.83	29.85	29.98	30.12	30.14	30.11	30.47	
	28.94	28.94	28.83	29.19	29.01	29.17	29.29	29.33	28.94	28.77	28.94	28.46	
Thermometer, mean.....	10.42	9.87	27.00	35.65	55.07	65.43	73.87	62.67	57.57	45.63	36.26	14.28	41.93
Thermometer, extremes	42.83	30.25	43.33	48.67	68.33	72.70	82.70	73.00	79.30	62.67	59.33	38.33	
	19.66	12.83	16.00	19.00	27.00	52.30	66.00	54.70	31.50	35.00	15.67	14.00	
1855.													
Barometer, mean inches..	29.66	29.49	29.43	29.54	29.55	29.48	29.62	29.74	29.68	29.56	29.69	29.65	29.59
Barometer, extremes....	30.65	30.04	29.99	29.95	29.83	29.79	29.86	29.93	30.05	29.97	30.19	30.19	
	28.83	29.08	28 81	28.39	29.21	28.90	29.34	29.46	29.29	29.08	28.97	28.62	
Thermometer, mean.....	21.64	12.63	26.30	38.33	52.97	61.40	70.10	69.18	55.88	47.86	32.43	22.17	41.99
Thermometer, extremes.	40.00	35.33	39.70	58.30	70.00	78.00	80.00	73.00	76.67	61.63	47.67	39.67	
	3.33	12.67	14.70	15.50	38.30	50.67	59.00	49.00	42.67	37.00	15.00	2.00	

Summary of Meteorological Observations, made at CONCORD, New Hampshire; Latitude, 43° 12′ N.; Longitude, 71° 29′ W. from Greenwich; Elevation above tide water, 374 feet. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observer, Dr. WM. PRESCOTT.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Barometer, mean inches..	29.66	29.66	29.51	29.61	29.57	29.54	29.64	29.64	29.72	29.71	29.46	29.53	29.60
Barometer, extremes....	30.27	30.33	30.01	30.24	30.00	29.86	29.88	30.01	30.13	30.18	30.14	30.41	
	28.90	29.07	28.83	29.17	29.17	29.23	29.34	29.34	29.30	28.95	28.85	28.52	
Thermometer, mean.....	19.69	18.56	29.48	40.69	59.80	67.17	71.67	69.57	61.03	50.64	38.91	20.61	45.65
Thermometer, extremes.	39.66	38.60	47.00	55.33	69.67	74.70	84.30	81.70	80.00	63.00	59.00	35.67	
	7.66	2.70	18.00	27.00	35.67	57.00	60.00	59.70	49.00	37.66	24.00	1.67	
1855.													
Barometer, mean inches..	29.71	29.53	29.47	29.59	29.58	29.51	29.66	29.69	29.74	29.55	29.69	29.65	29.61
Barometer, extremes...	30.60	30.05	29.97	29.13	29.90	29.82	29.96	30.00	30.05	30.00	30.11	30.17	
	28.61	29.15	28.87	28.67	29.22	29.06	29.38	29.30	29.31	29.06	29.00	28.53	
Thermometer, mean.....	24.40	18.26	30.13	42.43	55.70	64 07	72.21	66.24	60.65	49.97	37.09	27.09	45.69
Thermometer, extremes.	40 00	35.33	42.30	60.00	68.30	83.67	84.33	75.00	74.33	64.33	50.67	38.67	
	8.00	11.33	16.00	24.30	43.70	54.00	63.67	54.67	44.33	38.33	23.67	4.33	

Summary of Meteorological Observations, made at CHAPEL HILL, North Carolina; Latitude, 35° 54′ 21″ N.; Longitude, 79° 17′ 30″ W. from Greenwich. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observer, Professor JAMES PHILLIPS.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Barometer, mean inches..	29.60	29.59	29.50	29.49	29.45	29.41	29.46	29.46	29.50	29.54	29.49	29.48	29.49
Barometer, extremes....	30.07	29.93	29.88	30.04	29.67	29.62	29.58	29.59	29.83	29.83	29.85	29.92	
	29.05	29.19	29.14	29.11	29.28	29.10	29.35	29.29	29.06	29.09	28.95	29.01	
Thermometer, mean.....	40.70	45.31	54.77	56.88	68.70	75.93	81.07	78.30	74.90	62.65	49.17	39.51	60.68
Thermometer, extremes.	58.33	64.00	73.67	77.33	76.00	88.30	89.60	88.70	86.30	76.66	67.00	59.67	
	26.00	31.32	38.33	34.33	57.00	56.30	71.60	68.00	59.30	48.66	36.00	28.00	
1855.													
Barometer, mean inches..	29.52	29.41	29.40	29.49	29.42	29.40	29.47	29.46	29.53	29.44	29.53	29.52	29.47
Barometer, extremes...	30.07	29.71	29.81	29.70	29.64	29.63	29.66	29.69	29.77	29.67	29.77	30.07	
	28.88	28.93	28.91	28.97	29.11	29.13	29.30	29.25	29.32	29.12	29.00	28.83	
Thermometer, mean.....	41.79	36.40	46.83	64.03	67.73	74.11	80.20	76.68	73.56	58.50	53.87	43.50	60.60
Thermometer, extremes.	58.67	53.00	63.60	84.00	78.60	86.67	86.67	82.67	83.33	71.67	67.33	61.67	
	28.00	25.00	30.00	40.00	54.00	59.67	71.33	69.67	62.00	43.00	38.33	27.67	

Summary of Meteorological Observations, made at DETROIT, Michigan: Latitude, 42° 24′ N.; Longitude, 83° W. from Greenwich: Elevation above tide-water, 620 feet. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observer, Rev. GEORGE DUFFIELD.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Barometer, mean inches..	29.56	29.63	29.51	29.56	29.49	29.49	29.60	29.54	29.57	29.56	29.35	29.49	29.53
Barometer, extremes...	30.13	30.05	29.99	29.99	29.87	29.84	29.76	29.70	29.99	30.04	30.02	29.90	
	28.76	29.04	28.81	29.10	28.89	29.07	29.29	29.39	29.22	28.70	28.53	28.86	
Thermometer, mean.....	24.01	27.07	37.40	45.39	59.40	70.96	76.72	73.40	66.17	54.46	38.73	27.09	50.07
Thermometer, extremes	45.00	44.33	53.00	64 33	74.00	87.60	87.67	.....	85.30	65.00	50.33	39.67	
	5.00	6.60	20.33	29.67	42.00	59.00	61.67	60.00	50.30	37.67	26.33	5.67	
1855.													
Barometer, mean inches..	29.48	29.50	29.42	29.52	29.53	29.40	29.50	29.52	29.58	29.44	29.55	29.51	29.50
Barometer, extremes....	30.30	29.93	29.99	29.91	29 78	29.70	29.72	29.82	29.78	29.79	29.95	30.04	
	28.54	29.13	28.76	29.22	29.22	28.89	29.24	29.15	29.23	28.98	29.01	28.41	
Thermometer, mean....	28.31	18.01	31.37	49.67	58.20	64.74	73.08	69.77	65.24	47.26	41.62	28.41	47.97
Thermometer, extremes	56.00	38.00	46.00	73.00	73.70	83.33	84.33	80.60	78.00	62.33	58.67	46.67	
	8.67	7.00	17.70	25.00	36.30	46.00	62.67	57.00	50.00	33.00	26.33	8.33	

Summary of Meteorological Observations, made at the DEAF AND DUMB INSTITUTION, New York city; Latitude, 40° 43′ N.; Longitude, 74° 5′ W. from Greenwich; Elevation above tide-water, 159 feet. Hours of observation, 7 A. M., and at 2 and 9 P. M.
Observer, Professor O. W. MORRIS.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Barometer, mean inches..	29.85	29.93	29.83	29.88	29.84	29.83	29.90	29.89	29.98	29.99	29.80	29.87	29.88
Barometer, extremes....	30.52	30.44	30.24	30.55	30.20	30.09	30.12	30.16	30.39	30.36	30.41	30.60	
	29.36	29.39	29.07	29.34	29.47	29.52	29 69	29.61	29.61	29.39	29.07	28.98	
Thermometer, mean.....	29.59	33.12	37.13	46.69	60.85	70.00	77.20	74.10	66.30	56.71	44.11	28.07	51.99
Thermometer, extremes.	50.03	42.00	60.73	63.50	73.53	77.70	86.60	83.50	83.80	68.67	60.63	42.00	
	13.86	16.70	23.86	32.00	45.80	58.60	62.00	63.00	51.10	40.00	27.83	10.00	
Psychrometer, mean.....	77.00	79.00	72.00	73.00	69.00	68.00	67.00	62.00	68.00	69.00	69.00	77.00	71.00
Psychrometer, extremes	100.00	100.00	100.00	100.00	100.00	96.00	100.00	92.00	100.00	100.00	98.00	100.00	
	32.00	22.00	29.00	28.00	24.00	29.00	39.00	30.00	30.00	29.00	37.00	24.00	
1855.													
Barometer, mean inches..	29.99	29.89	29.89	29.95	29.91	29.86	29.95	30.00	30.05	29.90	30.03	30.01	29.96
Barometer, extremes....	30.72	30.26	30.36	30.27	30.22	30.11	30.25	30.33	30.34	30.30	30.35	30.49	
	29.05	29.52	29.25	29.20	29.53	29.44	29.80	29.48	29.67	29.50	29.29	29.08	
Thermometer, mean.....	31.52	23.83	35.57	47.40	59.33	68.40	75.14	71.30	66.18	53.21	44.28	34.72	50.22
Thermometer, extremes.	42.10	37.41	47.90	68.10	74.00	84.54	87.40	78.60	80.67	67.40	53.16	48.60	
	16.90	4.73	23.80	32.70	39.40	57.63	60.40	61.56	51.97	39.83	30.39	18.73	
Psychrometer, mean.....	78.00	73.00	69.00	69.00	69.00	70.00	78.00	70.00	68.00	71.00	71.00	58.00	70.00
Psychrometer, extremes.	100.00	100.00	100.00	100.00	100.00	100.00	100.00	95.00	96.00	100.00	100.00	97.00	
	33.00	10.00	15.00	18.00	25.00	24.00	43.00	37.00	42.00	28.00	41.00	9.00	

Summary of Meterological Observations, made at EXETER, New Hampshire; Latitude, 42° 58′ N.; Longitude, 70° 55′ W. from Greenwich. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observer, Rev. L. W. LEONARD.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Thermometer, mean.....	18.53	19.65	29.73	38.87	56.90	69.97	70.20	65.73	58.13	48.80	38.11	21.61	44.10
Thermometer, extremes. {	40.00	36.67	49.33	52.00	66.67	70.00	80.00	77.00	77.70	63.33	58.00	36.00	
	6.33	0.00	18.33	25.33	35.33	55.00	58.00	57.30	42.70	35.00	23.00	0.33	
1855.													
Thermometer, mean.....	25.11	17.12	30.27	40.80	52.07	61.47	68.54	62.72	57.73	52.18	36.56	26.52	44.26
Thermometer, extremes. {	40.67	35.33	42.00	57.70	68.70	77.00	79.67	70.33	74.33	61.33	56.00	41.00	
	14.33	11.33	18.00	24.00	41.30	53.00	60.33	51.33	44.33	34.33	20.33	10.3	

Summary of Meteorological Observations, made at DUBUQUE, Iowa; Latitude, 42° 29′ N.; Longitude, 90° 50′ W. from Greenwich; Elevation above tide-water, 680 feet. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observer, Dr. ASA HAN.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Barometer, mean inches..	29.37	29.31	29.26	29.28	29.16	29.25	29.34	29.37	29.37	29.37	29.23	29.33	29.30
Barometer, extremes... {	29.99	29.81	29.82	29.87	29.50	29.61	29.60	29.60	29.79	29.75	29.94	29.65	
	28.69	28.80	28.81	28.75	28.46	28.94	29.14	29.19	29.08	28.71	28.38	28.76	
Theremometer, mean.....	15.35	27.84	39.00	52.19	60.73	70.23	77.27	74.60	66.07	56.57	37.92	27.35	51.43
Thermometer, extremes {	41.50	42.00	54.67	79.00	74.33	86.00	87.70	84.70	86.00	72.33	53.67	38.33	
	7.33	12.00	21.00	26.00	52.33	45.00	67.70	62.00	55.00	38.50	20.33	12.00	
Psychrometer, mean.....	80.00	76.00	65.00	54.00	55.00	69.00	70.00	68.00	70.00	66.00	68.00	75.00	68.00
Psychrometer, extremes {	100.00	100.00	100.00	100.00	91.00	100.00	100.00	92.00	95.00	98.00	100.00	100.00	
	28.00	48.00	21.00	9.00	14.00	29.00	36.00	34.00	27.00	28.00	22.00	31.00	
1855.													
Barometer, mean inches..	29.26	29.37	29.27	29.31	29.31	29.21	29.27	29.35	29.34	29.32	29.30	29.35	29.31
Barometer, extremes.... {	29.93	29.85	29.76	29.78	29.67	29.61	29.47	29.63	29.55	29.65	29.78	29.94	
	28.83	28.77	28.52	28.97	28.80	28.85	28.99	29.08	29.04	28.80	28.58	28.25	
Thermometer, mean.....	24.22	18.75	31.33	55.43	63.90	68.05	73.22	69.32	64.61	48.45	39.58	21.63	48.21
Thermometer, extremes {	57.00	35.33	45.00	77.30	81.00	83.33	86.33	86.33	79.67	66.00	59.33	46.67	
	2.67	0.67	11.30	32.30	48.00	53.00	60.00	56.00	52.33	31.33	.....	9.33	
Psychrometer, mean.....	81.00	84.00	78.00	57.00	55.00	67.00	70.00	75.00	78.00	64.00	67.00	64.00	70.00
Psychrometer, extremes {	100.00	100.00	100.00	100.00	100.00	100.00	96.00	100.00	100.00	100.00	100.00	100.00	
	11.00	44.00	31.00	12.00	16.00	20.00	32.00	43.00	40.00	14.00	17.00	11.00	

Summary of Meteorological Observations, made at FREDERICK, Maryland; Latitude, 39° 24′ N.; Longitude, 77° 18′ W. from Greenwich. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observer, H. E. HANSHAW.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Barometer, mean inches..	29.82	29.77	29.66	29.68	29.65	29.61	29.69	29.69	29.76	29.78	29.60	29.66	29.70
Barometer, extremes .. {	30.28	30.25	30.08	30.36	29.92	29.94	29.87	29.96	30.17	30.16	30.21	30.33	
	28.97	29.19	29.09	29.09	29.43	29.93	29.51	29.42	29.32	29.18	28.97	29.13	
Thermometer, mean.....	32.32	35.21	41.24	50.83	65.84	74.07	81.33	77.10	70.30	55.83	42.78	31.56	54.87
Thermometer, extremes {	49.60	56.60	65.40	68.80	74.57	87.70	90.70	89.10	85.60	70.63	59.43	46.67	
	19.33	21.26	28.50	32.33	49.77	60.50	71.50	63.90	52.70	37.40	31.37	18.00	
1855.													
Barometer, mean inches..	29.76	29.61	29.51	29.57	29.53	29.47	29.58	29.61	29.68	29.55	29.66	29.67	29.60
Barometer, extremes.... {	30.46	29.92	30.01	29.88	29.77	29.74	29.78	29.93	29.90	29.99	29.93	30.35	
	29.01	29.29	29.01	29.12	29.22	29.09	29.36	29.22	29.34	29.20	29.06	28.61	
Thermometer, mean.....	33.39	26.39	38.37	54.47	64.50	70.79	78.46	72.66	67.76	51.43	46.25	35.08	53.30
Thermometer, extremes {	48.23	41.10	51.30	76.20	78.20	89.00	87.33	79.27	79.83	64.97	59.07	47.27	
	21.93	5.43	25.60	34.90	47.90	61.07	63.00	62.17	53.67	39.10	32.13	20.40	
Psychrometer mean.....	80.00	74.00	64.00	61.00	55.00	70.00	73.00	80.00	87.00	76.00	75.00	72.00	72.00
Psychrometer extremes {	100.00	100.00	99.00	100.00	99.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	
	39.00	39.00	0.00	22.00	18.00	27.00	42.00	47.00	62.00	39.00	34.00	0.00	

Summary of Meteorological Observations, made at FORT MADISON, Iowa; Latitude, 40° 37′ N.; Longitude, 91° 28′ W. from Greenwich. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observer, D. McCready.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
Thermometer, mean.....	21.16	32.97	42.67	56.20	65.96	76.33	85.77	81.57	72.70	58.40	39.25	30.44	55.29
Thermometer, extremes.	49.00	55.00	63.00	78.00	78.00	89.60	94.00	91.30	91.00	75.00	56.00	45.00	
	6.00	8.00	29.00	27.00	53.00	50.00	67.00	67.00	55.00	41.00	24.00	9.33	
1855.													
Thermometer, mean.....	26.95	21.15	33.87	57.37	64.73	72.21	79.26	73.49	70.39	49.73	41.26	24.02	51.20
Thermometer, extremes.	61.00	42.67	51.60	80.30	88.70	88.00	91.33	90.33	81.00	65.67	62.00	51.00	
	2.67	0.67	11.30	35.00	47.00	55.37	64.00	60.33	50.33	32.67	21.00	7.00	

Summary of Meteorological Observations, made at GLENWOOD, Tennessee; Latitude, 36° 28′ N.; Longitude, 87° 13′ W. from Greenwich; Elevation above tide-water, 481 feet. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observer, H. M. Stewart.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Barometer, mean inches..	29.67	29.60	29.54	29.53	29.45	29.51	29.58	29.58	29.58	29.69	29.54	29.63	29.57
Barometer, extremes....	30.25	29.99	29.94	30.06	29.72	29.70	29.74	29.71	30.05	29.96	29.98	29.85	
	28.91	28.97	29.12	29.12	29.04	29.23	29.43	29.46	29.17	29.15	28.93	29.24	
Thermometer, mean.....	37.40	44.24	52.84	58.66	66.29	73.97	80.53	80.77	76.47	60.39	45.38	38.09	59.55
Thermometer, extremes.	56.60	63.17	71.07	76.25	75.33	84.00	87.50	88.40	85.10	76.69	57.39	58.66	
	13.93	27.20	38.47	35.25	52.60	60.60	73.60	72.70	63.60	48.00	29.67	20.80	
Psychrometer, mean.....	69.00	64.00	65.00	58.00	74.00	80.00	76.00	68.00	69.00	78.00	67.00	69.00	70.00
Psychrometer, extremes.	100.00	95.00	98.00	92.00	99.00	98.00	96.00	99.00	97.00	99.00	98.00	98.00	
	4.00	0.00	30.00	19.00	29.00	49.00	41.00	36.00	28.00	38.00	22.00	23.00	
1855.													
Barometer, mean inches..	29.60	29.60	29.56	29.58	29.50	29.49	29.55	29.56	29.58	29.58	29.59	29.62	29.57
Barometer, extremes....	30.23	29.92	30.07	29.94	29.72	29.77	29.76	29.80	29.75	29.82	29.99	30.02	
	28.77	29.05	28.87	29.31	29.21	29.23	29.41	29.27	29.33	29.26	29.24	29.04	
Thermometer, mean.....	39.67	34.35	44.00	63.07	66.07	69.71	76.82	76.36	73.79	54.68	52.59	38.05	57.42
Thermometer, extremes.	64.40	58.50	67.20	80.30	82.80	79.97	82.33	82.00	79.23	62.83	67.77	57.23	
	16.00	15.77	27.00	43.20	50.30	55.57	68.03	71.80	57.70	34.87	35.90	19.87	
Psychrometer, mean.....	72.00	68.00	58.00	58.00	72.00	79.00	82.00	86.00	85.00	74.00	72.00	71.00	73.00
Psychrometer, extremes.	100.00	100.00	98.00	99.00	98.00	98.00	100.00	100.00	100.00	98.00	100.00	100.00	
	14.00	25.00	14.00	19.00	21.00	33.00	43.00	51.00	40.00	26.00	27.00	14.00	

Summary of Meteorological Observations, made at GETTYSBURG, Pennsylvania; Latitude, 39° 51′ N.; Longitude, 77° 15′ W. from Greenwich. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observer, Professor M. Jacobs.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Barometer, mean inches..	29.50	29.46	29.41	29.42	29.33	29.36	29.44	29.44	29.50	29.51	29.34	29.43	29.43
Barometer, extremes...	29.97	29.94	29.84	30.05	29.66	29.66	29.61	29.66	29.87	29.93	29.93	30.08	
	28.74	28.92	28.67	28.83	29.11	29.00	29.28	29.19	29.06	28.84	28.63	28.81	
Thermometer, mean.....	27.91	31.64	41.09	49.26	63.80	71.70	79.00	75.83	69.60	55.54	41.10	28.44	52.91
Thermometer, extremes.	47.33	48.67	65.33	69.00	73.00	86.00	88.00	85.70	84.30	70.33	58.33	41.00	
	12.66	17.33	24.00	31.00	48.50	59.70	71.00	62.00	50.70	37.00	28.33	12.00	
1855.													
Barometer, mean inches..	29.49	29.39	29.36	29.44	29.39	29.34	29.44	29.48	29.53	29.38	29.53	29.49	29.44
Barometer, extremes...	30.30	29.77	29.87	29.76	29.65	29.61	29.72	29.80	29.78	29.79	29.83	30.09	
	28.78	29.02	28.79	28.89	29.04	28.92	29.23	29.02	29.10	28.98	28.86	28.47	
Thermometer, mean.....	30.04	22.64	35.37	52.23	63.83	67.54	78.53	70.56	67.94	49.98	44.05	31.59	[illegible]
Thermometer, extremes.	49.67	38.33	48.00	77.00	76.30	86.00	84.33	77.67	78.00	62.67	55.33	4[illegible]	
	19.00	1.33	21.30	31.00	43.30	58.00	61.33	60.33	51.67	36.00	32.30	12.33	

Summary of Meteorological Observations, made at GOUVERNEUR, New York; Latitude, 44° 25′ N.; Longitude, 75° 35′ W. from Greenwich. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observer, Dr. P. O. WILLIAMS.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Thermometer, mean.....	17.93	16.05	27.77	39.40	60.13	66.70	78.10	70.37	59.73	49.47	34.87	20.76	45.11
Thermometer, extremes.	47.33	37.33	45.00	56.33	75.67	78.30	86.70	78.70	81.30	65.67	52.33	38.33	
	14.33	0.14	7.43	24.67	30.00	57.30	62.00	59.30	41.30	32.00	18.67	0.16	
1855.													
Thermometer, mean.....	24.66	13.94	27.47	43.60	58.53	62.91	72.58	68.05	62.22	48.24	35.15	30.04	45.70
Thermometer, extremes.	46.33	35.67	42.00	62.00	72.70	80.00	83.33	81.33	77.33	62.00	50.67	49.33	
	8.67	26.00	6.00	18.70	44.70	47.33	60.00	58.00	40.33	31.33	18.67	10.87	

Summary of Meteorological Observations, made at HARRISBURG, Pennsylvania; Latitude, 40° 16′ N.; Longitude, 76° 50′ W. from Greenwich. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observer, Dr. J. HERSELY.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Barometer, mean inches..	29.80	29.78	29.67	29.69	29.65	29.65	29.75	29.75	29.81	29.83	29.60	29.71	29.72
Barometer, extremes....	30.27	30.24	30.13	30.34	29.94	29.95	29.91	30.00	30.19	30.21	30.16	30.39	
	29.04	29.23	29.05	29.31	29.45	29.29	29.60	29.51	29.41	29.12	28.96	29.10	
Thermometer, mean.....	31.22	33.54	42.56	51.13	67.67	75.27	80.63	78.03	73.40	58.66	45.02	30.93	55.67
Thermometer, extremes.	50.33	47.00	60.67	72.00	76.00	87.70	90.60	85.70	88.00	72.67	63.00	41.00	
	20.00	24.00	28.33	33.00	53.33	67.70	78.60	68.30	56.00	40.67	36.67	16.67	
1855.													
Barometer, mean inches..	29.75	29.71	29.67	29.74	29.71	29.64	29.74	29.77	29.86	29.70	29.85	29.81	29.75
Barometer, extremes....	30.40	30.09	30.17	30.07	29.98	29.97	30.02	30.10	30.07	30.03	30.12	30.35	
	29.05	29.33	29.11	29.20	29.34	29.24	29.56	29.33	29.49	29.25	29.31	28.83	
Thermometer, mean.....	31.80	25.74	37.80	53.60	64.93	71.54	79.05	75.05	66.17	53.06	47.83	35.34	53.49
Thermometer, extremes.	41.00	39.33	50.30	72.00	78.00	89.33	89.00	81.33	82.67	63.00	58.67	46.67	
	23.33	1.33	27.70	34.70	48.70	62.00	64.00	66.67	56.67	40.67	37.67	29.00	

Summary of Meteorological Observations, made at JACKSONVILLE, Florida; Latitude, 30° 15′ N.; Longitude, 82° W. from Greenwich; Elevation above tide-water, 14 feet. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observer, Dr. A. S. BALDWIN.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Barometer, mean inches..	30.25	30.18	30.12	30.08	29.99	30.01	30.11	30.10	30.05	30.12	30.09	30.14	30.10
Barometer, extremes....	30.62	30.46	30.42	30.57	31.21	30.15	30.26	30.18	30.30	30.32	30.35	30.44	
	29.80	29.41	29.40	29.62	29.81	29.81	29.92	30.01	29.42	29.86	29.60	29.34	
Thermometer, mean.....	57.48	60.43	67.88	65.19	76.36	80.50	83.33	82.67	80.90	71.23	59.28	49.44	69.56
Thermometer, extremes.	69.67	70.67	77.67	76.67	82.00	87.30	89.30	89.00	85.30	78.00	73.67	66.33	
	42.67	45.67	50.33	50.33	64.33	65.70	76.70	78.00	73.30	61.66	44.33	39.67	
Psychrometer, mean.....	86.00	83.00	82.00	81.00	84.00	86.00	81.00	81.00	85.00	83.00	81.00	88.00	83.00
Psychrometer, extremes.	100.00	100.00	98.00	95.00	100.00	100.00	96.00	96.00	100.00	100.00	100.00	100.00	
	13.00	5.00	56.00	45.00	49.00	56.00	49.00	38.00	59.00	56.00	51.00	18.00	
1855.													
Barometer, mean inches..	30.17	30.10	30.10	30.16	30.04	30.08	30.15	30.10	30.12	30.09	30.09	30.20	30.12
Barometer, extremes...	30.60	30.55	30.43	30.36	30.27	30.28	30.30	30.31	30.32	30.36	30.31	30.58	
	29.58	29.65	29.45	29.85	29.64	29.85	30.02	29.94	29.91	29.80	29.61	29.81	
Thermometer, mean.....	55.31	51.77	60.50	70.31	76.46	78.37	81.32	82.15	80.56	66.13	68.91	59.05	69.24
Thermometer, extremes.	66.33	69.00	76.30	80.67	91.00	82.67	84.67	85.67	85.33	80.00	77.00	71.67	
	37.00	40.67	39.30	58.33	65.70	72.67	75.67	74.67	75.66	49.00	49.33	42 33	
Psychrometer, mean.....	83.00	81.00	77.00	80.00	80.00	86.00	86.00	87.00	88.00	86.00	91.00	89.00	85.00
Psychrometer, extremes.	100.00	100.00	100.00	95.00	91.00	100.00	100.00	100.00	96.00	100.00	100.00	100.00	
	39.00	51.00	0.00	15.00	45.00	50.00	60.00	66.00	65.00	65.00	65.00	47.00	

Summary of Meteorological Observations, made at LEWISBURG, Virginia; Latitude, 37° 49′ N.; Longitude, 80° 28′ W. from Greenwich. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observer, Dr. T. PATTON.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Thermometer, mean.....	33.92	38.42	47.19	51.62	65.33	70.93	79.67	74.90	70.00	56.47	42.27	34.43	55.29
Thermometer, extremes.	58.67	54.33	69.67	72.67	74.00	83.00	85.00	85.30	81.30	69.33	56.33	52.67	
	17.33	25.67	30.67	28.00	50.67	59.00	71.30	66.70	56.30	42.00	31.33	30.33	
1855.													
Thermometer, mean.....	37.55	30.06	41.60	56.10	64.33	67.15	74.62	72.94	67.56	50.46	47.77	36.46	53.89
Thermometer, extremes.	50.67	40.67	55.00	70.30	77.00	77.67	79.00	78.00	76.33	60.67	60.67	50.33	
	22.33	17.00	25.30	38.30	44.30	51.33	65.33	60.67	50.67	33.00	33.33	17.67	

Summary of Meteorological Observations, made at LIMA, Pennsylvania; Latitude, 39° 55′ N.; Longitude, 75° 25′ W. from Greenwich; Elevation above tide-water, 196 feet. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observer, J. EDWARDS.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual.
Barometer, mean inches..	29.95	29.90	29.78	29.84	29.78	29.77	29.86	29.86	29.94	29.93	29.73	29.89	29.84
Barometer, extremes....	30.46	30.39	30.23	30.50	30.14	30.06	30.05	30.14	30.32	30.34	30.33	30.54	
	29.23	29.39	29.05	29.20	29.52	29.45	29.69	29.58	29.51	29.98	29.07	29.09	
Thermometer, mean.....	29.86	31.79	39.95	48.19	62.34	70.07	76.60	72.23	66.43	54.03	42.29	28.96	51.90
Thermometer, extremes	51.95	50.00	63.47	68.00	71.60	81.50	89.10	81.90	82.60	66.30	59.83	43.07	
	18.10	18.40	26.10	30.40	47.17	56.60	67.70	64.50	48.90	37.40	27.73	8.00	
Psychrometer, mean.....	79.00	76.00	68.00	73.00	73.00	79.00	78.00	77.00	77.00	76.00	72.00	78.00	76.00
Psychrometer, extremes.	100.00	100.00	100.00	100.00	98.00	98.00	99.00	96.00	100.00	100.00	100.00	100.00	
	37.00	27.00	20.00	12.00	20.00	43.00	38.00	42.00	35.00	21.00	35.00	44.00	
1855.													
Barometer, mean inches..	29.93	29.79	29.76	29.85	29.79	29.75	29.85	29.89	29.95	29.80	29.93	29.91	29.85
Barometer, extremes....	30.62	30.20	30.28	30.17	30.13	30.03	30.16	30.24	30.21	30.18	30.23	30.48	
	29.04	29.44	29.30	29.18	29.38	29.39	29.61	29.42	29.57	29.33	29.28	28.92	
Thermometer, mean.....	32.46	24.85	36.57	50.40	60.50	68.73	76.33	70.51	64.95	50.89	44.95	33.72	51.95
Thermometer, extremes.	50.40	42.03	49.10	72.60	75.30	86.20	84.00	77.20	74.50	66.10	58.40	51.00	
	20.60	3.63	18.90	32.60	44.60	58.20	69.33	60.70	50.50	38.50	30.00	17.10	
Psychrometer, mean.....	80.00	72.00	64.00	67.00	60.00	78.00	81.00	80.00	81.00	80.00	77.00	77.00	75.00
Psychrometer, extremes	100.00	100.00	100.00	100.00	97.00	98.00	100.00	98.00	100.00	100.00	100.00	100.00	
	34.00	23.00	24.00	12.00	10.00	39.00	46.00	40.00	38.00	34.00	33.00	33.00	

Summary of Meteorological Observations, made at LODI, New York; Latitude, 42° 37′ N.; Longitude, 76° 53′ W. from Greenwich. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observer, J. LEFFERTS.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Thermometer, mean.....	25.12	23.06	31.88	41.79	58.77	68.10	75.80	71.80	63.77	53.98	36.70	22.75	47
Thermometer, extremes.	47.67	43.34	52.67	63.00	71.00	82.00	86.00	82.00	84.00	66.00	53.33	39.33	
	3.00	5.67	13.67	22.00	32.67	56.70	63.00	57.00	45.30	36.00	22.00	5.67	
1855.													
Thermometer, mean.....	25.95	15.87	29.17	45.04	55.73	62.91	71.61	66.29	61.51	46.10	39.53	26.43	45.68
Thermometer, extremes.	39.33	37.00	47.30	66.30	72.00	83.33	83.33	74.33	78.00	63.67	55.00	43.33	
	9.33	18.33	13.00	19.70	36.30	48.67	62.33	52.67	42.33	30.00	22.67	11.00	

Summary of Meteorological Observations, made at MENDEN, Massachusetts; Latitude, 42° 6′ N.; Longitude, 71° 34′ W. from Greenwich. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observer, Dr. J. G. METCALF.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Thermometer, mean.....	23.66	22.51	30.77	40.64	56.33	65.80	73.80	67.40	61.50	51.96	40.99	23.70	46.59
Thermometer, extremes	47.67	38.66	53.67	57.20	65.33	78.10	83.10	77.10	78.20	67.00	64.67	36.67	
	0.00	1.50	17.67	28.00	35.35	55.00	57.10	56.00	47.00	39.20	29.33	3.53	
1855.													
Thermometer, mean	28.11	19.14	30.57	44.30	54.77	65.16	72.52	66.96	61.48	53.28	39.60	29.69	47.13
Thermometer, extremes	45.67	36.00	40.70	57.30	68.10	84.33	87.00	75.67	78.67	65.00	53.00	44.00	
	12.67	10.33	20.70	22.00	40.00	56.00	63.00	55.33	43.33	39.33	25.33	12.33	

Summary of Meteorological Observations, made at MANCHESTER, New Hampshire; Latitude, 42° 59′ N.; Longitude, 71° 28′ W. from Greenwich; Elevation above tide-water, 300 feet. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observer, S. N. Bell.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Barometer, mean inches...	30.06	30.07	29.91	30.02	29.95	29.93	30.02	30.01	30.08	30.08	29.86	29.90	29.99
Barometer, extremes....	30.67	30.70	30.39	30.63	30.42	30.22	30.25	30.47	30.57	30.48	30.50	30.77	
	29.37	29.45	29.27	29.50	29.57	29.65	29.74	29.85	29.68	29.33	29.27	28.93	
Thermometer, mean.....	21.79	22.47	32.61	43.55	61.52	68.30	75.63	70.43	61.33	51.60	40.09	23.15	47.71
Thermometer, extremes	41.35	40.33	52.33	57.00	72.00	77.30	86.30	80.70	83.30	63.33	59.67	38.33	
	7.67	1.67	19.67	28.67	37.33	57 70	60.00	60.30	47.70	39.33	24.67	2.00	
1855.													
Barometer, mean inches..	30.09	29.91	29.89	29.94	29.95	29.87	30.01	30.02	30.06	29.85	30.10	29.93	29.97
Barometer, extremes....	30.91	30.51	30.37	30.30	30.29	30.16	30.29	30.33	30.35	30.18	30.48	30.34	
	29.14	29.64	29.26	29.05	29.60	29.43	29.72	29.50	29.63	29.43	29.44	29.08	
Thermometer, mean.....	26.67	19.92	32.33	42.03	56.72	66.46	74.70	67.13	60.12	55.63	36.05	27.81	47.13
Thermometer, extremes	44.33	37.33	47.00	53.30	70.33	86.33	87.00	76.33	76.67	65.00	48.67	39.33	
	9.00	15.33	20.00	24.30	44.67	56.67	64.33	52.33	45.33	40.33	21.00	7.00	

Summary of Meteorological Observations, made at MORRISVILLE, Pennsylvania; Latitude, 40° 12′ N.; Longitude, 74° 53′ W. from Greenwich; Elevation above tide water, 30 feet. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observer, E. Hance.

1554.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Barometer, mean inches..	30.17	29.73	30.04	30.06	30.03	30.02	30.10	30.10	30.16	30.17	29.99	30.11	30.06
Barometer, extremes....	30.65	30.60	30.45	30.70	30.35	30.35	30.25	30.30	30.50	30.50	30.55	30.80	
	29.45	29.60	29.30	29.50	29.70	29.75	29.95	29.85	29.80	29.60	29.35	29.35	
Thermometer, mean.....	29.15	31.18	39.00	47.85	63.83	68.73	75.00	71.63	66.03	55.51	42.70	28.00	51.55
Thermometer, extremes.	51.67	44.00	60.67	66.67	71.00	78.30	85.00	81.30	82.00	69.00	59.00	40.67	
	16.33	19.67	25.67	31.33	49.00	56.70	65.00	64.30	52.00	42.66	28.67	11.00	
1855.													
Barometer, mean inches..	30.18	30.05	30.03	30.12	30.07	30.03	30.11	30.16	30.20	30.04	30.15	30.14	30.11
Barometer, extremes....	30.90	30.45	30.50	30.45	30.40	30.30	30.40	30.50	30.45	30.45	30.48	30.65	
	29.35	29.65	29.45	29.50	29.70	29.65	29.90	29.70	29.85	29.60	29.52	29.20	
Thermometer, mean.....	31.88	24.95	36.17	49.07	59.70	67.38	74.16	69.70	64.69	50.62	44.24	33.45	50.50
Thermometer, extremes.	49.00	40.00	50.00	67.70	73.30	81.33	83.67	76.67	77.33	67.33	56.67	46.00	
	21.00	3.33	23.30	34.70	40.70	60.00	64.67	62.00	52.67	39.67	32.00	18.67	

Summary of Meteorological Observations, made at MILTON, Indiana; Latitude, 39° 47′ N.; Longitude, 85° 2′ W. from Greenwich; Elevation above tide water, 800 feet. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observer, Dr. V. Kusey.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Barometer, mean inches..	29.09	29.06	29.00	29.06	28.98	29.02	29.09	29.09	29.09	29.06	28.91	29.00	29.04
Barometeer, extremes..	29.64	29.48	29.40	29.47	29.26	29.30	29.27	29.17	29.34	29.38	29.62	29.29	
	28.46	28.42	28.45	28.60	28.37	28.66	28.87	28.94	28.71	28.44	27.74	28.59	
Thermometer, mean.....	27.35	34.12	42.75	51.35	62.88	71.63	79.37	75.10	70.17	55.33	38.21	32.00	53.[illegible]
Thermometer, extremes.	51.16	50.00	59.50	72.50	75.16	85.30	87.70	87.30	83.50	68.67	50.00	51.00	
	3.67	21.67	27.00	29.80	47.50	50.70	71.70	64.00	53.00	42.83	25.00	18.83	
1855.													
Barometer, mean inches..	29.02	29.07	29.02	29.09	29.04	28.99	29.06	29.08	29.10	29.03	29.06	29.06	29.05
Barometer, extremes....	29.67	29.51	29.47	29.43	29.31	29.28	29.23	29.38	29.26	29.33	29.40	29.51	
	28.07	28.48	28.16	28.82	28.64	28.53	28.84	28.89	28.83	28.73	28.53	28.08	
Thermometer, mean.....	31.62	23.53	33.60	54.43	62.47	66.82	75.75	72.19	68.81	51.82	43.85	29.68	51.21
Thermometer, extremes.	57.50	40.50	47.20	78.50	79.20	82.67	85.33	83.00	78.83	65.00	60.15	47.85	
	8.16	7.33	19.70	30.50	42.20	46.17	68.50	56.83	53.67	35.33	27.10	0.66	

Summary of Meteorological Observations, made at NANTUCKET, Massachusetts; Latitude, 41° 17′ N.; Longitude 70° 6′ W. from Greenwich; Elevation above tide water, 30 feet. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observer, W. MITCHELL.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Barometer, mean inches...	30.09	30.05	29.91	29.97	29.98	29.92	30.02	30.01	30.08	30.05	29.85	29.88	29.98
Barometer, extremes....	30.80	30.70	30.35	30.60	30.38	30.18	30.21	30.30	30.49	30.46	30.49	30.73	
	29.10	29.56	29.10	29.28	29.51	29.61	29.76	29.74	29.65	29.37	29.11	29.62	
Thermometer, mean.....	32.61	30.67	37.07	43.95	53.13	63.47	71.73	69.23	62.73	56.11	47.22	35.07	50.25
Thermometer, extremes.	48.50	43.50	49.67	54.67	62.33	74.20	77.70	77.50	74.50	63.60	60.33	45.33	
	12.86	15.27	25.83	33.33	42.33	51.70	63.60	61.30	51.30	45.30	33.67	23.33	
Psychrometer, mean.....	80.00	69.00	57.00	70.00	72.00	74.00	74.00	74.00	73.00	77.00	73.00	73.00	72.00
Psychrometer, extremes.	100.00	100.00	100.00	100.00	100.00	93.00	94.00	100.00	97.00	100.00	100.00	100.00	
	8.00	0.00	0.00	0.00	17.00	17.00	35.00	41.00	22.00	37.00	37.00	0.00	
1855.													
Barometer, mean inches..	30.11	29.89	29.87	29.95	29.91	29.92	30.02	30.05	30.09	29.92	30.02	29.98	29.98
Barometer, extremes....	30.86	30.39	30.35	30.31	30.30	30.17	30.32	30.37	30.35	30.35	30.49	30.54	
	29.15	29.51	29.32	28.89	29.35	29.41	29.77	29.47	29.6	29.49	29.37	29.11	
Thermometer, mean.....	37.31	29.20	36.40	44.77	52.30	63.74	70.35	68.64	64.1	57.31	44.53	29.27	50.66
Thermometer, extremes.	49.50	42.50	45.80	53.20	61.70	76.00	78.33	75.50	75.8	64.73	57.67	51.83	
	31.33	8.33	29.80	31.50	42.80	59.00	61.33	60.67	54.10	45.67	34.00	25.83	
Psychrometer, mean.....	73.00	66.00	67.00	67.00	69.00	74.00	78.00	69.00	67.00	76.00	74.00	73.00	71.80
Psychrometer, extremes.	100.00	100.00	100.00	100.00	100.00	97.00	100.00	100.00	97.00	100.00	100.00	100.00	
	33.00	0.00	32.00	20.00	14.00	29.00	45.00	25.00	12.00	26.00	38.00	37.00	

Summary of Meteorological Observations, made at MUSCATINE, Iowa; Latitude, 41° 26′ N.; Longitude, 91° 5′ W. from Greenwich; Elevation above tide-water, 586 feet. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observer, T. S. PARVIN.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Barometer, mean inches...	29.57	29.56	29.47	29.47	29.38	29.47	29.56	29.53	29.55	29.54	29.45	29.60	29.51
Barometer, extremes....	30.15	30.01	29.85	29.96	29.70	29.76	29.71	29.72	29.93	29.86	30.11	29.90	
	29.00	29.03	28.96	29.00	28.74	29.23	29.32	29.37	29.28	29.11	28.85	29.10	
Thermometer, mean.....	16.21	28.39	38.91	51.44	58.55	69.02	76.39	73.19	68.12	55.41	36.85	26.84	49.94
Thermometer, extremes.	45.00	48.66	56.67	68.33	75.00	82.33	84.67	81.67	84.33	71.67	53.33	40.00	
	4.00	0.00	21.00	22.33	45.67	47.00	62.00	62.33	50.00	40.33	22.67	13.33	
1855.													
Barometer, mean inches...	29.49	29.61	29.45	29.59	29.49	29.38	29.40	29.47	29.48	29.49	29.48	29.53	29.48
Barometer, extremes....	29.93	29.99	29.90	29.92	29.77	29.73	29.61	29.82	29.69	29.86	29.93	30.04	
	29.10	29.03	28.75	29.23	28.99	29.05	29.23	29.20	29.23	29.05	28.94	28.56	
Thermometer, mean.....	24.24	19.85	30.30	54.30	60.43	67.67	73.05	70.45	67.66	47.11	37.69	21.23	47.65
Thermometer, extremes.	59.33	36.33	46.00	77.30	75.70	84.33	84.67	83.00	83.00	64.33	57.67	45.67	
	4.67	3.00	5.70	32.70	42.70	50.33	62.33	58.35	48.00	31.00	20.00	9.00	

Summary of Meteorological Observations, made at NEW HARMONY, Indiana; Latitude, 38° 8′ N.; Longitude, 87° 9′ W. from Greenwich; Elevation above-tide-water, 320 feet. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observer, J. CHAPPELLSMITH.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual.
Barometer, mean inches..	29.78	29.70	30.27	29.64	29.56	29.61	29.67	29.66	29.67	29.72	29.61	29.70	29.72
Barometer, extremes....	30.46	30.21	30.09	30.15	29.81	29.82	29.79	29.76	30.03	29.97	30.09	29.95	
	29.14	29.04	29.16	29.18	29.07	29.32	29.46	29.52	29.30	29.10	29.06	29.30	
Thermometer, mean.....	31.33	40.55	48.30	57.07	66.97	79.93	83.50	80.67	75.00	59.59	41.97	35.70	58.38
Thermometer, extremes.	53.00	60.67	67.00	77.33	78.67	88.30	90.00	92.50	86.00	75.50	54.33	56.00	
	9.33	26.00	34.00	33.67	53.33	56.30	72.30	70.50	57.60	47.00	27.33	18.30	
Psychrometer, mean.....	82.00	77.00	69.00	68.00	71.00	75.00	63.00	71.00	77.00	79.00	79.00	86.00	75.00
Psychrometer, extremes.	100.00	100.00	100.00	100.00	100.00	100.00	100.00	97.00	100.00	100.00	100.00	100.00	
	33.00	5.00	1.00	22.00	28.00	44.00	25.00	31.00	34.00	45.00	19.00	45.00	
1855.													
Thermometer, mean.....	35.18	29.84	38.87	59.69	66.61	72.49	79.63	75.79	74.16	52.82	48.60	33.79	55.69
Thermometer, extremes.	57.33	50.33	59.00	80.33	85.30	85.67	87.67	83.00	81.00	63.33	68.33	51.33	
	16.33	13.33	23.30	39.00	49.30	56.33	71.67	64.33	57.67	35.67	31.67	8.00	
Psychrometer, mean.....	89.00	86.00	79.00	66.00	72.00	76.00	80.00	84.00	87.00	83.00	82.00	82.00	81.00
Psychrometer, extremes.	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	
	46.00	30.00	32.00	26.00	13.00	45.00	51.00	54.00	65.00	39.00	41.00	42.00	

Summary of Meteorological Observations, made at NEW BEDFORD, Massachusetts; Latitude, 41° 39′ N.; Longitude, 70° 56′ W. from Greenwich; Elevation above tide-water, 90 feet. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observer, S. RODMAN.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual.
Barometer, mean inches.	30.40	30.22	29.79	29.90	29.85	29.92	30.04	30.02	30.10	30.07	29.76	29.84	29.99
Barometer, extremes...	30.67	30.64	30.24	30.52	30.29	30.17	30.24	30.33	30.49	30.43	30.37	30.64	
	29.66	30.03	29.15	29.47	29.43	29.62	29.79	29.75	29.66	29.35	29.23	28.87	
Thermometer, mean.....	28.83	26.79	34.05	43.23	57.17	65.33	72.30	70.93	62.10	54.54	43.77	28.28	48.94
Thermometer, extremes	47.50	42.50	54.67	59.17	65.83	75.80	82.20	77.70	75.70	64.50	61.83	42.33	
	6.17	7.00	31.33	30.50	43.17	54.30	60.80	61.30	46.50	40.50	24.17	9.50	
Psychrometer, mean.....	89.00	90.00	85.00	80.00	84.00	87.00	89.00	89.00	90.00	89.00	86.00	90.00	87.00
Psychrometer, extremes.	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	
	50.00	50.00	38.00	40.00	48.00	57.00	62.00	64.00	55.00	29.00	52.00	68.00	
1855.													
Barometer, mean inches...	29.98	29.83	29.82	29.86	29.85	29.81	29.93	30.07	30.00	29.83	29.95	29.91	29.90
Barometer, extremes....	30.75	30.32	30.27	30.21	30.22	30.08	30.25	30.98	30.29	30.29	30.32	30.47	
	28.98	29.48	29.13	28.87	29.37	29.40	29.70	29.37	29.53	29.32	29.25	28.89	
Thermometer, mean.....	32.04	23.54	33.80	44.50	53.77	64.49	70.63	66.34	61.19	54.10	42.99	34.25	48.47
Thermometer, extremes.	49.00	39.17	44.80	60.30	63.70	86.67	80.17	75.80	76.33	65.70	56.33	49.00	
	14.80	7.83	23.00	27.20	39.00	55.16	62.67	55.17	48.67	42.70	26.67	17.67	
Psychhromter, mean.....	89.00	81.00	77.00	81.00	82.00	84.00	87.00	80.80	81.00	81.00	80.00	77.00	82.00
Psychrometer, extremes.	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	
	15.00	51.00	51.00	0.00	26.00	46.00	56.00	36.00	38.00	41.00	37.00	27.00	

Summary of Meteorological Observations, made at NORTH ATTLEBORO', Massachusetts; Latitude, 41° 52′ N.; Longitude, 71° 23′ W. from Greenwich; Elevation above tide-water, 175 feet. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observer, H. RICE.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Barometer, mean inches..	29.88	29.87	29.71	29.81	29.75	29.73	29.69	29.60	29.91	29.90	29.67	29.71	29.77
Barometer, extremes...	30.48	30.53	30.18	30.43	30.22	30.02	30.05	30.16	30.37	30.29	30.31	30.58	
	29.18	29.17	29.09	29.22	29.33	29.42	29.38	29.30	29.43	29.18	29.09	28.76	
Thermometer, mean.....	24.85	24.46	32.77	43.58	57.37	66.10	73.23	67.53	60.93	51.56	41.22	26.27	47.49
Thermometer, extremes	45.40	39.00	55.70	62.40	67.77	75.80	85.90	77.30	80.80	66.80	62.20	43.33	
	3.00	1.50	19.57	29.00	38.93	55.90	57.70	56.00	44.60	36.67	30.33	6.40	
Psychrometer, mean.....	77.00	70.00	71.00	68.00	72.00	74.00	67.00	77.00	77.00	77.00	75.00	78.00	74.00
Psychrometer, extremes.	100.00	100.00	100.00	100.00	100.00	98.00	100.00	100.00	100.00	100.00	100.00	100.00	
	8.00	0.00	0.00	0.00	25.00	22.00	34.00	37.00	29.00	0.00	17.00	28.00	
1855.													
Barometer, mean inches..	29.89	29.70	29.67	29.78	29.75	29.71	29.84	29.87	29.91	29.74	29.87	29.83	29.80
Barometer, extremes...	30.71	30.23	30.18	30.13	30.11	30.01	30.15	30.21	30.22	30.18	30.27	30.37	
	28.87	29.34	29.06	28.79	29.35	29.27	29.59	29.27	29.44	29.24	29.17	28.76	
Thermometer, mean.....	29.51	20.84	32.53	44.13	54.27	64.88	71.97	64.39	57.66	39.17	41.51	31.49	46.02
Thermometer, extremes	46.20	40.43	45.10	58.36	67.80	81.90	84.33	71.57	74.83	62.10	50.63	45.30	
	13.00	9.00	22.60	23.50	39.00	56.26	60.00	51.40	45.33	36.66	25.29	10.83	
Psycarometer, mean.....	81.00	73.00	61.00	59.00	57.00	69.00	77.00	74.00	67.00	72.00	71.00	69.00	69.00
Psychrometer, extremes	100.00	100.00	100.00	94.00	97.00	96.00	96.00	98.00	95.00	100.00	100.00	100.00	
	40.00	0.00	7.00	2.00	13.00	18.00	17.00	30.00	23.00	23.00	25.00	24.00	

Summary of Meteorological Observations, made at NEW WIED, Texas; Latitude, 29° 42′ N.; Longitude, 98° 15′ W. from Greenwich. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observer, Professor J. C. ERVENDBERG.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual.
Thermometer, mean.....	48.39	54.86	68.32	69.33	75.07	82.47	84.53	85.73	80.87	73.56	59.51	49.11	69.31
Thermometer, extremes	65.00	68.67	79.00	81.00	87.00	88.40	88.60	89.60	86.30	81.00	72.67	64.67	
	22.66	40.00	52.60	53.00	66.00	72.70	79.00	79.70	76.30	66.00	42.50	29.67	
Psychrometer, mean.....	57.00	69.00	76.00	70.00	78.00	79.00	77.00	71.00	76.00	78.00	69.00	67.00	72.00
Psychrometer, extremes.	100.00	100.00	100.00	100.00	100.00	100.00	100.00	96.00	100.00	100.00	100.00	100.00	
	0.00	18.00	11.00	23.00	31.00	37.00	30.00	41.00	36.00	47.00	13.00	0.00	
1855.													
Thermometer, mean.....	51.98	50.59	59.80	73.33	81.47	81.17	83.64	83.79	80.98	67.17	62.75	51.18	68.99
Thermometer, extremes	65.33	68.00	80.30	81.30	88.30	87.33	87.67	88.67	85.67	84.33	80.33	71.33	
	30.67	29.67	39.70	55.30	71.70	65.67	77.33	75.67	73.67	49.33	47.67	23.67	
Psychrometer, mean.....	72.00	76.00	72.00	77.00	75.00	78.00	80.00	85.00	86.00	80.00	78.00	72.00	78.00
Psychrometer, extremes.	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	
	0.00	13.00	24.00	29.00	33.00	29.00	39.00	44.00	58.00	33.00	29.00	0.00	

Summary of Meteorological Observations, made at OBERLIN, Ohio; Latitude, 41° 20′ N.; Longitude, 82° 15′ W. from Greenwich; Elevation above tide-water, 800 feet. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observer, Professor J. H. FAIRCHILD.

1854.	Jan.	Feb.	Mar.	April	May.	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual.
Barometer, mean inches..	29.11	29.11	29.04	29.09	29.07	29.07	29.16	29.15	29.22	29.18	28.95	29.06	29.10
Barometer, extremes....	29.66	29.88	29.44	29.61	29.40	29.38	29.36	29.32	29.61	29.87	29.61	29.49	
	28.33	28.55	28.41	28.67	28.50	28.70	28.92	28.96	28.83	28.36	28.12	28.52	
Thermometer, mean.....	26.96	29.18	40.29	43.82	59.47	69.80	76.67	73.03	68.60	55.66	39.85	29.45	51.07
Thermometer, extremes.	48.66	48.66	59.00	67.70	70.00	85.30	87.00	85.70	87.00	66.00	54.67	46.33	
	3.24	12.00	27.00	29.70	43.00	55.00	63.70	60.70	49.60	40.00	30.33	10.33	
1855.													
Barometer, mean inches..	29.05	29.08	29.01	29.15	29.11	29.01	29.11	29.17	29.18	29.08	29.14	29.10	29.10
Barometer, extremes....	29.89	29.60	29.58	29.51	29.39	29.30	29.32	29.48	29.35	29.37	29.50	29.70	
	28.16	28.69	28.37	28.85	28.87	28.56	28.87	28.81	28.86	28.68	28.48	28.02	
Thermometer, mean.....	29.42	20.37	33.33	52.53	59.30	65.31	74.30	70.43	67.97	48.32	43.70	30.42	49.62
Thermometer, extremes.	55.67	42.00	51.00	75.30	76.30	84.67	82.67	80.33	77.67	64.00	60.33	46.33	
	11.00	2.33	8.00	19.00	38.00	52.33	63.67	56.67	52.67	33.67	31.33	9.33	

Summary of Meteorological Observations, made at NORRISTOWN, Pennsylvania; Latitude, 40° 8′ N.; Longitude, 75° 19′ W. from Greenwich; Elevation above tide-water, 153 feet. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observer, Rev. J. G. RALSTON.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Barometer, mean inches,	29.96	29.95	29.82	29.89	29.83	29.83	29.91	29.93	30.00	30.04	29.77	29.86	29.90
Barometer, extremes....	30.69	30.52	30.29	30.58	30.20	30.14	30.11	30.19	30.41	30.42	30.37	30.66	
	29.13	29.39	29.27	29.28	29.54	29.51	29.73	29.64	29.56	29.40	29.14	29.22	
Thermometer, mean.....	31.78	32.30	40.47	50.36	62.75	70.50	76.87	72.43	67.87	54.69	43.37	29.04	52.70
Thermometer, extremes.	55.00	49.00	64.00	70.33	71.67	80.30	85.60	83.50	82.30	71.33	61.33	40.17	
	17.33	19.33	24.67	32.80	48.43	57.50	67.30	62.70	49.00	38.67	31.83	8.67	
Psychrometer, mean	71.00	71.00	75.00	71.00	73.00	78.00	78.00	77.00	77.00	79.00	74.00	66.00	74.00
Psychrometer, extremes.	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	
	20.00	34.00	26.00	26.00	15.00	38.00	45.00	37.00	43.00	26.00	45.00	23.00	
1855.													
Barometer, mean inches..	29.99	29.85	29.81	29.94	29.86	29.81	29.89	29.93	30.03	29.89	29.97	30.03	29.92
Barometer, extremes....	30.71	30.26	30.35	30.43	30.18	30.09	30.19	30.29	30.28	30.26	30.28	30.55	
	29.12	29.48	29.16	29.46	29.45	29.45	29.68	29.45	29.66	29.46	29.19	29.27	
Thermometer, mean.....	31.88	25.07	37.17	49.70	58.63	67.55	75.73	70.27	63.99	52.92	45.17	32.25	50.80
Thermometer, extremes.	40.10	40.67	50.00	69.70	72.00	83.60	83.67	77.60	77.33	65.33	57.67	44.67	
	22.00	3.33	20.80	34.70	43.30	57.03	62.00	61.67	52.33	39.00	30.00	17.60	
Psychrometer, mean.....	72.00	58.00	73.00	77.00	61.00	69.00	77.00	77.00	75.00	76.00	70.00	67.00	71.00
Psychrometer, extremes.	100.00	100.00	100.00	100.00	93.00	100.00	95.00	95.00	100.00	100.00	100.00	100.00	
	36.00	0.00	8.00	22.00	0.00	32.00	24.00	49.00	38.00	33.00	31.00	15.00	

Summary of Meteorological Observations, made at PENN YAN, New York; Latitude, 42° 42′ N.; Longitude, 77° 11′ W. from Greenwich; Elevation above tide-water, 740 feet. Hours of observation, 7 A. M., and at 2 and 9, P. M. Observer, Dr. H. P. SARTWELL.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Barometer, mean inches...	29.20	29.19	29.10	29.19	29.18	29.19	29.29	29.28	29.32	29.34	29.08	29.14	29.21
Barometer, extremes....	29.67	29.62	29.58	29.67	29.48	29.53	29.49	29.47	29.71	29.73	29.70	29.73	
	28.41	28.59	28.46	28.40	28.91	28.85	29.10	29.06	29.02	28.56	28.39	28.59	
Thermometer, mean.....	25.27	24.54	33.58	41.63	56.28	66.23	73.28	70.16	64.62	53.22	37.74	25.56	47.68
Thermometer, extremes.	50.67	40.00	54.67	64.33	63.00	79.33	79.67	81.67	85.30	68.67	52.67	40.67	
	6.00	9.33	15.33	27.33	34.67	51.00	65.33	60.00	46.70	35.00	24.33	8.33	
1855.													
Barometer, mean inches...	29.22	29.14	29.10	29.24	29.26	29.16	29.29	29.31	29.36	29.17	29.28	29.32	29 23
Barometer, extremes....	30.00	29.50	29.60	29.64	29.45	29.46	29.50	29.59	29.59	29.96	29.65	29.74	
	28.39	28.79	28.55	28.70	28.90	28.69	29.04	28.83	28.94	28.65	28.63	28.18	
Thermometer, mean.....	28.01	19.02	30.76	45.07	54.03	61.51	69.18	65.48	61.70	47.74	40.48	29.81	46.07
Thermometer, extremes.	42.67	39.33	44.33	68.30	67.10	77.67	81.33	73.67	78.00	64.67	55.00	45.33	
	12.00	14.00	17.33	21.30	36.67	49.33	59.00	56.00	44.33	33.67	22.00	13.67	

Summary of Meteorological Observations, made at OTTAWA, Illinois; Latitude, 41° 20′ N.; Longitude, 88° 47′ W. from Greenwich. Hours of observation, 7 A. M., and at 2 and 9 P. M.
Observer, Dr. J. O. HARRIS.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Thermometer, mean.....	20.01	31.46	38.48	51.67	62.29	71.87	79.80	75.87	69.00	54.58	37.98	27.35	51.70
Thermometer, extremes.	43.35	53.33	56.00	73.33	74.00	86.00	88.00	85.00	85.30	70.67	59.80	43.33	
	1.33	12.33	22.67	21.67	48.67	49.30	67.30	62.70	54.70	40.67	23.33	13.33	
1855.													
Thermometer, mean.....	25.10	18.70	32.70	55.13	63.17	69.48	74.72	70.74	67.94	48.88	34.86	25.86	48.94
Thermometer, extremes.	55.67	39.33	45.00	78.70	84.70	88.33	86.33	84.00	78.33	66.00	42.67	56.33	
	1.33	2.67	12.70	31.30	44.30	50.67	62.67	62.67	53.67	36.00	24.00	3.00	

Summary of Meteorological Observations, made at PITTSBURG, Oakland Station, Pennsylvania; Latitude, 40° 32′ N.; Longitude, 80° 2′ W. from Greenwich; Elevation above tide water, 850 feet. Hours of observation, 7 A. M., and at 2 and 9 P. M.
Observer, W. W. WILSON.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Barometer, mean inches..	28.96	28.97	28.87	28.87	28.86	28.90	28.99	28.98	29.03	29.00	28.81	28.95	28.93
Barometer, extremes....	29.46	29.35	29.29	29.41	29.15	29.18	29.16	29.14	29.40	29.43	29.40	29.41	
	28.07	28.38	28.37	28.46	28.47	28.56	28.80	28.77	28.56	28.32	28.18	28.44	
Thermometer, mean.....	26.82	31.18	39.33	47.28	61.00	70.23	78.00	81.90	71.53	56.49	40.15	29.91	52.82
Thermometer, extremes.	50.00	49.33	56.00	65.33	72.33	83.70	87.30	87.00	87.70	68.00	56.33	48.00	
	4.00	10.67	18.00	28.00	41.00	55.30	67.70	60.30	53.30	39.33	31.00	11.33	
1855.													
Barometer, mean inches..	28.97	28.92	28.91	28.99	28.92	28.85	28.98	29.05	29.04	28.90	29.01	28.94	28.96
Barometer, extremes....	29.79	29.36	29.49	29.39	29.16	29.11	29.19	29.36	29.33	29.15	29.35	29.53	
	28.02	28.53	28.39	28.59	28.61	28.42	28.79	28.72	28.68	28.58	28.45	27.94	
Thermometer, mean.....	31.20	20.18	33.37	51.14	58.19	65.47	73.37	70.13	68.99	48.90	44.66	31.84	49.79
Thermometer, extremes.	50.00	36.67	48.70	72.00	71.30	84.00	80.00	76.67	78.00	61.00	58.67	47.33	
	14.33	3.33	19.30	24.00	44.00	53.34	66.00	58.67	52.25	35.33	27.00	11.33	

Summary of Meteorological Observations, made at PHILADELPHIA, Pennsylvania; Latitude, 39° 57′ 9″ N.; Longitude, 75° 10′ 37″, W. from Greenwich; Elevation above tide-water, 53 feet. Hours of observation, 7 A. M., and at 2 and 9 P. M.
Observer, Professor JAMES. A. KIRKPATRICK

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Barometer, mean inches..	30.07	29.94	29.85	29.87	29.85	29.82	29.91	29.95	30.00	29.98	29.83	29.89	29.91
Barometer, extremes....	30.47	30.40	30.26	30.51	30.13	30.09	30.12	30.18	30.39	30.33	30.36	30.50	
	29.46	29.43	29.15	29.24	29.58	29.54	29.71	29.70	29.66	29.55	29.26	29.24	
Thermometer, mean.....	32.91	34.84	43.56	51.39	65.43	73.13	80.37	76.63	70.20	59.12	46.11	31.27	55.37
Thermometer, extremes.	45.33	49.67	65.33	70.00	74.50	83.00	91.30	85.70	85.20	73.70	63.00	44.33	
	21.83	22.70	28.00	33.00	50.00	60.30	69.80	68.00	52.50	43.00	32.67	14.33	
Psychrometer, mean.....	87.00	83.00	73.00	69.00	67.00	70.00	69.00	70.00	74.00	72.00	72.00	77.00	74.00
Psychrometer, extremes.	100.00	100.00	100.00	100.00	100.00	95.00	95.00	100.00	100.00	97.00	97.00	100.00	
	48.00	33.00	23.00	31.00	25.00	33.00	36.00	40.00	45.00	40.00	36.00	50.00	
1855.													
Barometer, mean inches..	29.97	29.84	29.80	29.85	29.81	29.74	29.85	29.92	29.98	29.83	29.95	29.92	29.87
Barometer, extremes....	30.61	30.20	30.27	30.18	30.12	30.02	30.13	30.25	30.22	30.18	30.22	30.44	
	29.16	29.54	29.31	29.23	29.45	29.39	29.64	29.51	29.62	29.45	29.33	28.98	
Thermometer, mean.	34.33	26.67	38.80	52.20	63.77	71.87	79.73	75.03	70.21	52.74	48.20	37.50	54.31
Thermometer, extremes.	52.33	43.33	52.80	74.00	77.50	88.67	88.00	80.80	83.67	72.16	60.00	53.00	
	21.33	4.50	25.00	34.00	45.30	60.00	64.17	67.67	58.83	41.67	33.17	20.00	
Psychrometer, mean.....	78.00	71.00	63.00	64.00	57.00	68.00	72.00	70.00	72.00	74.00	71.00	73.00	69.00
Psychrometer, extremes.	100.00	100.00	94.00	96.00	100.00	95.00	94.00	94.00	94.00	97.00	97.00	100.00	
	36.00	23.00	27.00	22.00	16.00	34.00	43.00	39.00	45.00	42.00	28.00	40.00	

Summary of Meteorological Observations, made at POMFRET, Connecticut; Latitude, 41° 52′ N.; Longitude, 72° W. from Greenwich; Elevation above tide-water, 1,000 feet. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observer, Rev. D. Hunt.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual.
Barometer, mean inches..	28.92	28.76	28.57	28.87	28.87	28.85	28.95	28.94	29.00	28.99	28.77	28.77	28.86
Barometer, extremes....	29.66	29.51	29.23	29.45	29.37	29.19	29.13	29.24	29.36	29.35	29.35	29.55	
	28.16	28.44	28.20	28.41	28.55	28.70	28.71	28.68	28.56	28.34	28.22	27.96	
Thermometer, mean.....	24.17	23.51	31.46	41.58	57.63	65.40	72.10	67.03	59.67	51.98	39.76	23.74	46.52
Thermometer, extremes	48.66	37.00	52.00	60.00	66.33	75.30	82.70	76.30	75.30	64.33	61.67	38.33	
	1.00	6.33	18.33	28.33	36.67	52.70	57.00	57.30	44.30	37.67	22.33	4.00	
Psychrometer, mean.....	88.00	87.00	87.00	83.00	84.00	83.00	84.00	85.00	88.00	87.00	86.00	91.00	86 00
Psychrometer, extremes.	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	
	53.00	53.00	51.00	38.00	48.00	42.00	56.00	43.00	61.00	54.00	50.00	0.00	
1855.													
Barometer, mean inches..	28.96	28.80	28.77	28.88	28.86	29.83	28.93	28.96	29.00	28.83	28.95	28.90	28 97
Barometer, extremes....	29.70	29.23	29.22	29.18	29.20	29.10	29.22	29.28	29.28	29.22	29.32	29.35	
	28.03	28.46	28.21	28.00	28.51	28.43	28.65	28.42	28.74	28.33	28.32	27.95	
Thermometer, mean.....	27.94	19.65	31.00	42.73	54.23	63.85	70.34	65.05	60.02	43.51	39.29	29.32	45 58
Thermometer, extremes	47.33	37.00	44.30	59.30	68.70	81.33	82.00	73.67	74.67	64.33	54.33	42.33	
	10.00	9.00	19.70	22.00	38.30	53.67	69.67	53.33	47.67	38.33	23.67	12.00	
Psychrometer, mean.....	92.00	91.00	78.00	80.00	77.00	85.00	91.00	86.00	84.00	87.00	86.00	84.00	85 00
Psychrometer, extremes.	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	
	62.00	53.00	42.00	41.00	43.00	50.00	65.00	45.00	58.00	51.00	45.00	46.00	

Summary of Meteorological Observations, made at POULTNEY, Iowa; Latitude, 42° 40′ N.; Longitude. 91° 21′ W. from Greenwich. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observer, Dr. B. F. Odell.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual.
Thermometer, mean.....	9.94	23.05	36.44	49.42	57.46	67.67	73.67	70.40	63.80	53.54	33.54	24.36	46.94
Thermometer, extremes	36.40	39.76	53.97	72.20	71.00	82.30	83.30	79.70	79.70	67.70	54.00	39.33	
	12.40	7.50	17.60	29.00	47.00	43.00	63.00	58.00	50.70	34.70	15.33	11.67	
1855.													
Thermometer, mean.....	21.86	14.37	27.90	51.93	61.23	67.09	72.63	68.56	63.62	45.08	33.83	17.49	45.47
Thermometer, extremes	55.67	32.00	41.30	78.30	78.00	82.67	85.67	77.67	79.00	63.33	50.00	41.33	
	6.33	7.33	5.70	28.00	44.70	46.33	58.33	52.00	48.67	29.00	14.00	13.67	

Summary of Meteorological Observations, made at PRINCETON, Massachusetts; Latitude, 42° 28′ N.; Longitude, 71° 53′ W. from Greenwich; Elevation above tide-water, 1,113 feet. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observer, J. Brooks.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual.
Barometer, mean inches..	28.81	28.81	28.70	28.77	28.78	28.78	28.90	28.86	28.94	28.94	28.69	28.69	28.81
Barometer, extremes....	29.38	29.45	29.13	29.39	29.38	29.06	29.10	29.18	29.34	29.64	29.28	29.50	
	28.10	28.20	28.10	28.27	28.38	28.25	28.64	28.42	28.47	28.21	28.11	27.76	
Thermometer, mean..	21.18	19.06	26.27	39.97	55.53	63.23	70.93	66.33	58.60	52.81	37.33	20.99	44.35
Thermometer, extremes	43.38	38.00	36.67	56.20	68.20	70.70	81.20	73.40	76.30	64.33	57.67	36.93	
	3.00	3.73	11.20	21.00	39.64	52.70	53.20	56.50	42.30	36.67	20.50	2.33	
Psychrometer, mean.....	82.00	82.00	80.00	72.00	70.00	72.00	73.00	65.00	75.00	76.00	81.00	86.00	76.00
Psychrometer, extremes.	100.00	100.00	100.00	100.00	100.00	100.00	100.00	98.00	100.00	100.00	100.00	100.00	
	49.00	39.00	53.00	0.00	30.00	29.00	25.00	27.00	18.00	29.00	20.00	6.00	
1855.													
Barometer, mean inches..	28.87	28.67	28.66	28.78	28.79	28.75	28.89	28.91	28.95	28.75	28.87	28.80	28.81
Barometer, extremes....	29.68	29.20	29.10	29.58	29.11	29.03	29.87	29.23	29.27	29.19	29.37	29.31	
	27.88	28.30	28.08	27.84	28.45	28.30	28.18	28.33	28.46	28.98	28.21	27.76	
Thermometer, mean.....	24.74	17.12	28.17	40.50	52.87	61.03	69.76	63.55	58.70	48.15	36.96	26.65	43.96
Thermometer, extremes	44.50	34.33	44.20	55.70	66.20	78.20	79.00	72.30	73.80	62.00	52.00	38.33	
	6.67	5.57	17.40	17.80	36.80	49.33	57.33	54.17	42.80	36.17	19.33	8.67	
Psychrometer, mean.....	81.00	73.00	62.00	63.00	57.00	71.00	79.00	71.00	71.00	77.00	75.00	77.00	71.00
Psychrometer, extremes.	100.00	100.00	100.00	100.00	100.00	100.00	98.00	96.00	97.00	100.00	100.00	100.00	
	0.00	0.00	24.00	0.00	9.00	26.00	45.00	33.00	31.00	42.00	36.00	30.00	

Summary of Meteorological Observations, made at SAVANNAH, Georgia; Latitude, 32° 5′ N.; Longitude, 81° 7′ W. from Greenwich; Elevation above tide-water, 42 feet. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observer, Dr. J. F. Posey.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Barometer, mean inches..	30.19	30.13	30.07	30.03	29.99	29.98	30.07	30.06	30.02	30.11	30.02	30.10	30.06
Barometer, extremes...	30.61	30.46	30.43	30.58	30.22	30.14	30.21	30.15	30.35	30.37	30.32	30.44	
	29.60	29.62	29.71	29.52	29.77	29.76	29.86	29.91	29.04	29.74	29.49	29.66	
Thermometer, mean.....	52.60	54.80	63.73	63.75	73.77	78.60	82.67	81.83	78.10	67.37	55.63	48.57	66.79
Thermometer, extremes.	69.90	69.03	76.80	75.50	80.20	88.60	88.00	90.30	84.30	77.50	70.77	62.53	
	39.13	40.96	48.77	46.90	59.73	56.00	76.50	75.70	65.60	58.00	40.10	35.88	
Psychrometer, mean.....	75.00	70.00	67.00	66.00	75.00	77.00	74.00	76.00	79.00	1.00	64.00	64.00	71.00
Psychrometer, extremes.	99.00	96.00	97.00	95.00	93.00	94.00	93.00	92.00	98.00	87.00	96.00	96.00	
	28.00	26.00	18.00	26.00	32.00	37.00	26.00	39.00	49.00	28.00	31.00	25.00	
1855.													
Barometer, mean inches..	30.12	30.03	30.04	30.10	30.00	30.02	30.10	30.06	30.09	30.03	30.08	30.12	30.07
Barometer, extremes...	30.61	30.35	30.42	30.34	30.26	30.27	30.27	30.26	30.30	30.31	30.35	30.60	
	29.47	29.51	29.40	29.76	29.07	29.75	29.93	29.86	29.84	29.70	29.61	29.68	
Thermometer, mean.....	50.96	47.23	56.37	73.87	74.07	77.43	82.07	81.77	78.67	64.13	62.47	52.50	66.80
Thermometer, extremes.	62.20	66.97	72.70	85.90	85.80	82.46	84.33	87.17	85.00	77.36	71.80	67.90	
	35.90	32.73	36.90	55.90	63.70	70.06	76.00	70.43	71.00	46.20	45.67	28.30	
Psychrometer, mean.....	69.00	61.00	57.00	67.00	69.00	71.00	73.00	75.00	79.00	68.00	77.00	78.00	70.00
Psychrometer, extremes.	96.00	93.00	93.00	96.00	92.00	95.00	95.00	95.00	97.00	94.00	97.00	98.00	
	18.00	16.00	11.00	25.00	30.00	31.00	42.00	42.00	40.00	26.00	32.00	22.00	

Summary of Meteorological Observations, made at SPARTA, Georgia, Latitude, 33° 17′ N.; Longitude, 83° 9′ W. from Greenwich; Elevation above tide-water, 550 feet. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observer, Dr. E. M. Pendleton.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Barometer, mean inches..	29.52	29.48	29.41	29.39	29.32	29.34	29.40	29.41	29.41	29.47	29.47	29.48	29.43
Barometer, extremes...	29.90	29.80	29.72	29.89	29.58	29.47	29.54	29.51	29.70	29.68	29.68	29.80	
	29.03	29.04	29.06	28.98	29.18	29.15	29.27	29.29	28.89	29.12	28.88	29.17	
Thermometer, mean.....	46.32	48.15	60.84	57.11	72.97	78.10	81.87	81.37	76.67	63.92	51.70	43.61	63.55
Thermometer, extremes	70.33	63.00	79.00	78.00	81.67	86.30	88.00	87.70	85.30	77.00	65.33	60.67	
	30.00	32.67	45.33	40.67	56.00	54.30	76.00	72.70	63.30	53.67	33.67	29.67	
1555.													
Barometer, mean inches..	29.48	29.39	29.42	29.44	29.37	29.38	29.44	29.42	29.44	29.42	29.45	29.49	29.43
Barometer, extremes....	29.92	29.69	29.79	29.65	29.60	29.58	29.59	29.55	29.61	29.64	29.66	29.90	
	28.90	29.00	29.08	29.17	29.12	29.15	29.30	29.27	29.23	29.19	29.05	29.04	
Thermometer, mean.....	46.33	42.15	52.47	66.27	71.67	74.23	61.29	77.88	75.94	58.54	58.09	46.43	60.94
Thermometer, extremes.	63.67	60.67	73.00	82.70	86.30	81.67	83.00	83.33	80.67	70.67	70.67	64.00	
	27.67	26.00	31.00	49.00	56.00	60.67	70.67	67.33	69.67	38.00	40 67	28.33	

Summary of Meteorological Observations, made at SCHELLMAN HALL, Maryland; Latitude, 39° 23′ N.; Longitude, 76° 57′ W. from Greenwich; Elevation above tide-water, 700 feet. Hours of observation, 7 A. M., and at 2 and 9 P. M.

Observer, Harriet M. Baer.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Thermometer, mean.....	31.28	35.44	44.73	50.98	65.50	71.40	78.63	75.67	70.40	58.47	43.70	30.58	54.73
Thermometer, extremes	55.33	60.00	63.33	69.33	75.33	84.70	87.60	86.30	86.00	69.33	62.67	44.33	
	17.33	18.67	29.00	29.33	48.33	59.30	69.30	65.70	55.00	36.67	31.00	14.67	
1855.													
Thermometer, mean.....	32.65	24.96	38.27	53.97	63.93	68.78	76.04	71.61	67.86	52.48	45.96	33.41	52.46
Thermometer, extremes	50.33	43.33	51.70	77.30	77.70	87.67	85.67	80.00	81.00	66.00	61.00	52.00	
	20.00	2.33	24.70	34.30	47.00	56.67	64.67	62.67	55.33	38.00	30.33	16.67	

Summary of Meteorological Observations, made at ST. LOUIS, Missouri; Latitude, 38° 37′ N.; Longitude, 90° 16′ W. from Greenwich; Elevation above tide-water, 482 feet. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observer, Dr. G. ENGELMAN.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Barometer, mean inches..	29.57	29.50	29.45	29.43	29.33	29.41	29.48	29.48	29.50	29.52	29.43	29.52	29.47
Barometer, extremes....	30.26	29.89	29.92	29.93	29.63	29.65	29.66	29.61	29.82	29.81	29.96	29.78	
	28.88	28.98	28.96	28.91	28.84	29.15	29.25	29.31	29.18	29.08	28.84	29.12	
Thermometer, mean.....	28.43	39.42	47.40	56.87	67.97	76.53	84.03	82.30	76.03	60.93	43.33	37.15	58.37
Thermometer, extremes	53.67	59.33	70.67	78.00	76.33	88.00	90.50	91.40	88.30	75.00	56.17	54.33	
	5.33	25.25	35.33	31.00	54.33	57.30	71.20	70.70	60.00	48.67	28.17	17.50	
Psychrometer, mean	69.00	66.00	62.00	61.00	63.00	68.00	69.00	59.00	63.00	74.00	63.00	68.00	65.00
Psychrometer, extremes	100.00	100.00	96.00	97.00	94.00	98.00	91.00	93.00	93.00	97.00	100.00	100.00	
	30.00	20.00	15.00	28.00	21.00	37.00	26.00	23.00	28.00	29.00	21.00	25.00	
1855.													
Barometer, mean inches..	29.47	29.53	29.48	29.48	29.41	29.38	29.43	29.49	29.48	29.49	29.49	29.52	29.47
Barometer, extremes....	30.19	30.00	30.03	29.92	29.70	29.74	29.61	29.75	29.65	29.83	29.92	29.99	
	28.64	28.83	28.78	29.24	29.03	29.11	29.27	29.26	29.30	29.07	28.99	28.60	
Thermometer, mean.....	33.82	29.87	39.40	62.22	66.76	71.65	79.65	74.36	73.06	53.93	47.11	32.06	55.39
Thermometer, extremes.	47.67	47.00	60.80	82.20	84.02	85.83	86.67	85.00	80.81	67.00	66.00	54.17	
	11.80	7.33	20.00	40.33	51.02	55.50	74.00	64.00	57.83	34.00	28.67	2.50	
Psychrometer, mean.....	71.00	70.00	63.00	49.00	65.00	68.00	70.00	79.00	79.00	66.00	70.00	71.00	68.00
Psychrometer, extremes.	95.00	93.00	100.00	93.00	93.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	
	23.00	25.00	20.00	17.00	9.00	20.00	30.00	38.00	42.00	24.00	0.00	16.00	

Summary of Meteorological Observations, made at SPRINGFIELD, Massachusetts; Latitude, 42° 6′ N.; Longitude, 72° 35′ W. from Greenwich; Elevation above tide-water, 199 feet. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observer, L. C. ALLEN.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Thermometer, mean.....	22.75	22.75	32.17	44.05	60.59	67.73	75.03	70.23	62.30	52.29	40.62	23.15	47.81
Thermometer, extremes.	40.67	38.67	53.33	62.00	69.67	76.30	87.00	79.30	78.70	66.00	61.67	41.33	
	1.33	6.00	19.00	30.67	38.67	54.00	58.30	60.30	45.30	38.00	22.33	1.67	
1855.													
Thermometer, mean.....	26.96	20.53	33.00	45.10	57.73	66.64	74.04	68.89	63.54	51.22	40.32	29.53	48.23
Thermometer, extremes.	42.33	36.33	47.00	63.30	71.30	86.33	84.33	77.33	79.00	67.33	54.67	42.00	
	9.33	6.00	20.70	22.30	40.70	55.33	61.67	57.00	48.67	39.33	26.00	10.33	

Summary of Meteorological Observations, made at WARRINGTON, Florida; Latitude, 30° 21′ N.; Longitude, 87° 16′ W. from Greenwich; Elevation above tide-water, 12 feet. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observer, J. PEARSON.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Barometer, mean inches..	30.13	30.10	30.17	30.04	29.91	29.91	29.99	29.96	29.94	30.03	30.03	30.12	30.03
Barometer, extremes...	30.54	30.54	30.60	30.56	30.19	30.08	30.19	30.12	30.19	30.25	30.29	30.31	
	29.53	29.67	29.81	29.69	29.70	29.77	29.88	29.85	29.65	29.76	29.57	29.82	
Thermometer, mean.....	55.27	60.04	65.72	63.91	75.86	81.90	85.20	83.60	81.70	72.51	61.43	54.05	70.10
Thermometer, extremes.	72.00	74.33	75.67	72.67	82.00	89.70	91.60	89.00	89.00	81.33	75.00	62.67	
	37.33	43.67	53.33	51.33	65.00	69.30	79.30	76.30	76.00	66.67	46.33	40.00	
1855.													
Barometer, mean inches..	30.09	30.07	30.04	30.05	29.93	29.98	30.03	30.02	30.04	30.04	30.00	30.10	30.03
Barometer, extremes....	30.44	30.34	30.48	30.26	30.15	30.16	30.19	30.19	30.20	30.27	30.21	30.48	
	29.57	29.67	29.73	29.74	29.71	29.75	29.88	29.83	29.81	29.81	29.79	29.79	
Thermometer, mean.....	56.61	51.03	58.67	69.73	75.80	79.03	80.73	81.19	80.82	67.82	66.82	56.85	68.76
Thermometer, extremes.	67.33	64.67	73.30	76.70	81.00	82.67	83.67	85.00	83.67	76.67	76.00	72.67	
	37.33	35.67	40.70	61.30	67.70	73.33	77.00	76.33	75.33	48.00	54.67	33.33	

Summary of Meteorological Observations, made at WAMPSVILLE, New York,; Latitude, 43° 4′ N.; Longitude, 75° 50′ W. from Greenwich; Elevation above tide-water, 500 feet. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observer, Dr. S. SPOONER.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Thermometer, mean.....	26.01	22.22	32.23	42.87	58.77	67.83	74.47	70.10	62.80	52.25	37.86	23.72	47.59
Thermometer, extremes.	49.00	40.00	51.00	62.00	72.67	79.00	84.00	80.30	81.00	68.00	54.33	39.67	
	0.00	2.67	17.00	27.00	33.33	58.00	66.00	60.30	43.00	36.67	21.00	5.67	
1855.													
Thermometer, mean.....	27.73	17.62	30.43	44.65	56.35	64.75	72.28	67.67	61.88	47.88	39.95	29.92	46 76
Thermometer, extremes.	42.00	36.00	45.00	65.00	75.30	84.00	81.00	76.67	78.33	64.33	55.33	46.00	
	9.33	21.00	11.70	22.00	41.00	52.33	61.00	55.33	46.33	33.67	22.33	7.67	

Summary of Meteorological Observations, made at WHITE-MARSH ISLAND, Georgia; Latitude, 32° N.; Longitude, 81° W. from Greenwich; Elevation above tide-water, 18 feet. Hours of observation, 7 A. M., and at 2 and 9 P. M Observer, R. T. GIBSON.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Thermometer, mean.....	52.10	53.95	61.52	62.17	72.03	76.57	80.73	79.33	76.43	66.20	53.85	46.48	65.11
Thermometer, extremes.	63.33	66.00	71.33	73.10	78.00	85.00	87.10	87.00	84.00	76.00	69.67	59.00	
	37.67	38.33	50.00	45.10	57.00	56.00	75.00	73.30	65.00	56.20	39.00	33.67	
1855.													
Thermometer, mean.....	49.76	46.60	54.60	65.67	73.43	76.86	81.93	81.59	78.27	63.51	61.95	52.29	65.54
Thermometer, extremes.	61.67	66.33	69.30	81.00	83.00	81.67	84.33	86.00	83.33	75.33	71.67	65.33	
	35.33	32.33	36.30	54.00	62.70	69.00	77.33	70.67	71.00	46.67	45.00	37.33	

Summary of Meteorological Observations, made at WORCESTER, Massachusetts; Latitude, 42° 16′ N.; Longitude, 71° 48′ W. from Greenwich; Elevation above tide-water, 536 feet. Hours of observation, 7 A. M., and at 2 and 9 P. M. Observer, Dr. E. A. SMITH.

1854.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Barometer, mean inches..	29.49	29.47	29.33	29.43	29.39	29.37	29.46	29.46	29.53	29.54	29.34	29.34	29.43
Barometer, extremes....	30.05	30.00	29.77	30.05	29.81	29.66	29.70	29.79	29.90	29.91	29.97	30.16	
	28.84	28.85	28.65	29.00	29.00	29.11	29.22	29.20	29.02	28.82	28.89	28.34	
Thermometer, mean.....	23.68	23.39	32.34	43.23	60.20	67.20	74.87	69.63	61.87	52.30	40.23	24.23	47.76
Thermometer, extremes	40.33	40.00	54.00	61.30	69.83	78.50	87.80	78.60	79.00	65.00	58.00	43.00	
	1.33	6.00	22.00	26.00	37.00	55.30	56.00	59.50	45.00	38.00	22.33	4.33	
Psychrometer, mean.....	54.00	54.00	55.00	64.00	64.00	66.00	62.00	58.00	68.00	70.00	75.00	57.00	62.00
Psychrometer, extremes.	100.00	100.00	100.00	100.00	99.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	
	0.00	0.00	0.00	0.00	12.00	30.00	30.00	24.00	25.00	39.00	14.00	0.00	
1855.													
Barometer, mean inches..	29.45	29.38	29.35	29.44	29.44	29.39	29.50	29.47	29.54	29.39	29.51	29.47	29.44
Barometer, extremes....	30.17	29.87	29.80	29.79	29.78	29.67	29.82	29.83	29.88	29.78	29.88	30.24	
	28.59	29.02	28.85	28.57	29.09	28.94	29.27	28.92	29.16	28.88	28.44	28.65	
Thermometer, mean.....	27.63	19.20	32.60	43.47	55.20	65.07	72.25	66.17	59.94	50.20	39.59	29.93	46.77
Thermometer, extremes.	41.33	37.00	53.30	58.70	70.30	85.33	85.00	75.00	76.67	65.00	53.00	42.67	
	12.33	10.33	21.70	24.00	39.20	55.00	60.00	54.00	42.00	37.67	22.00	9.67	

FLOWERING OF THE APPLE-TREE IN MASSACHUSETTS.

Table showing the date of the flowering of the apple-tree at Mansfield, Massachusetts, from 1798 *to* 1856, *inclusive*: ISAAC STEARNS, *observer.*

1798, May 13.	1810, May 19.	1822, May 15.	1834, May 20.	1846, May 15
1799, May 19.	1811, May 15.	1823, May 23.	1835, May 29.	1847, May 28.
1800, May 17.	1812, June 2.	1824, May 19.	1836, May 21.	1848, May 19.
1801, May 17.	1813, May 25.	1825, May 15.	1837, May 30.	1849, May 29.
1802, May 26.	1814, May 14.	1826, May 15.	1838, May 30.	1850, June 3.
1803, May 22.	1815, May 27.	1827, May 17.	1839, May 18.	1851. May 22.
1804, May 22.	1816, May 28.	1828, May 17.	1840, May 17.	1852, May 26.
1805, May 14.	1817, May 23.	1829, May 21.	1841, May 29.	1853, May 14.
1806, May 27.	1818, May 27	1830, May 9.	1842, May 19.	1854, May 21.
1807, May 27.	1819, May 27.	1831, May 14.	1843, May 22.	1855, May 26.
1808, May 18.	1820, May 17.	1832, May 31.	1844, May 11	1856, May 28.
1809, May 25.	1821, May 27.	1833, May 12.	1845, May 21.	

These dates refer to the days on which the flowers had fully expanded on the different varieties of the apple-tree, excepting some of the late kinds, such as the Russet. The notes were commenced by Isaac Stearns, sr., and prosecuted until his death, in 1837, since which time they have been carefully continued by his family.

The extreme dates are May 9, 1830, and June 3, 1850, a difference of twenty-five days. The mean of these two dates is May 21½, which is the mean of the whole fifty-nine years—the first half averaging May 21, and the second half May 22.

The evidence afforded by these records is opposed to the theories of those who allege that our seasons are gradually growing colder. According to this table, the spring of 1812 opened later than any since, with the exception of that of 1850. The spring of 1856 was considered very tardy, but was earlier than the spring of 1812, 1818, 1832, 1835, 1837, 1838, 1849, or 1850, and varied but little from that of 1802, 1806, 1807, 1809, 1813, 1815, 1816, 1819, 1829, 1841, 1847, 1852, or 1855.

The earliest thirteen seasons were, in order, 1830, 1844, 1833, 1798, 1805, 1814, 1831, 1853, 1811, 1822, 1825, 1826, 1846; in each of which years the full blossoms appeared before or on the 15th of May.

The latest thirteen seasons occurred in 1851, 1812, 1832, 1837, 1838, 1818, 1835, 1856, 1816, 1847, 1806, 1807, and 1815.

COMMERCIAL STATISTICS.

Statement of the quantity and estimated value of articles of merchandise, of domestic growth and manufacture, exported from St. Marks, Florida, in the year ending December 31, 1855: *by* HUGH ARCHER, *Collector of Customs.*

ARTICLES.	Am't conveyed coastward by river.	Average prices.	Valuation.
Cotton, Sea Island.....bales...	5,000	$80 00	$400,000 00
Cotton, Upland.....bales...	41,856	40 00	1,674,240 00
Cotton yarn.....bales...	1,564	30 00	46,920 00
Cattle, beef.....number...	239	15 00	3,585 00
Cedar logs.....number...	1,564	5 00	7,820 00
Fish.....barrels...	256	5 00	1,280 00
Hides.....bales...	50	60 00	3,000 00
Hides.....number...	6,398	1 50	9,597 00
Lumber, sawed.....M. feet...	62	15 00	930 00
Leather.....sides...	100	7 00	700 00
Moss.....bales...	4	12 00	48 00
Molasses.....barrels...	3,168	12 00	38,016 00
Oranges.....thousand...	12	35 00	420 00
Oil, rosin.....barrels...	1,038	10 00	10,380 00
Oil, rosin.....casks...	100	50 00	5,000 00
Otter skins.....number...	130	2 00	260 00
Pitch.....barrels...	2,347	2 00	4,694 00
Potatoes, sweet.....barrels...	50	2 25	112 50
Palmetto logs.....feet...	12,080	3	362 40
Rosin.....barrels...	14,833	1 50	22,249 50
Reeds.....number...	201	25	50 25
Rope cuttings.....bales...	15	24 00	360 00
Rags.....bales...	4	15 00	60 00
Skins, deer.....bales...	122	25 00	3,050 00
Skins, deer.....number...	1,383	25	345 75
Sugar.....hogsheads...	650	80 00	52,000 00
Sugar.....barrels...	50	22 00	1,100 00
Syrup.....barrels...	50	15 00	750 00
Tar.....barrels...	247	3 00	750 00
Turpentine, spirits of.....barrels...	3,684	20 00	73,680 00
Tallow.....barrels...	20	25 00	500 00
Tobacco, leaf.....cases...	1,577	60 00	94,620 00
Varnish.....barrels...	10	12 00	120 00
Wool.....bales...	74	50 00	3,700 00
Wax, bees.....barrels...	11	45 00	495 00
Wood.....cords...	1,640	3 00	4,920 00
Total.....			2,466,115 50

Statement of the quantity and estimated value of articles of merchandise, of domestic growth and manufacture, exported from New London, Connecticut, in the year ending December 31, 1855: *by* H. HOBART, *Collector of Customs.*

ARTICLES.	Amount shipped to for'n ports.	Average prices.	Valuation.
Apples, dried.....pounds...	7,300	$0 8	$584
Bacon, hams.....pounds...	8,666	12	1,040
Beans.....bushels...	85	2 00	170
Beef, salt.....barrels...	931	15 20	14,151
Biscuit or ship-bread.....pounds...	188,300		10,959
Bricks, common.....thousand...	10	8 00	80
Broad-cloth.....yards...	73	1 86	136
Butter.....pounds...	5,420	25	1,355
Candles.....pounds...	1,979	22⅓	442
Cheese.....pounds...	3,041	13	395
Coal, anthracite.....tons...	166	7 18	1,192
Cordage and cables.....pounds...	57,847	15	8,677
Corn, shelled.....bushels...	14	1·00	14
Corn-meal.....barrels...	60	5 57	334
Flour.....barrels...	636	8 68	5,520
Gin.....gallons...	400	63	252
Implements, agricultural.....valuation...	.....	....	30
Lard.....pounds...	2,596	12¾	330
Lead, bar.....pounds...	500	6	30
Lumber, all kinds.....feet...	193,000	....	5,180
Molasses.....gallons...	9,300	33	3,069
Oil, linseed.....gallons...	205	97	199
Onions.....bushels...	237	52	123
Paint, mineral.....pounds...	1,800	15½	275
Peaches, dried.....pounds...	540	14	76
Peas.....bushels...	50	1 50	75
Pork.....barrels...	1,083	16 73	18,119
Potatoes, common.....bushels...	482	53½	258
Rice.....tierces...	14	36 21	507
Rum.....gallons...	2,440	48½	1,183
Salt.....bushels...	460	39½	182
Shot.....pounds...	1,000	6½	65
Shooks for 19,700 barrels.....	.....	.....	18,965
Spirits of turpentine.....gallons...	35	46	16
Sugar, cane.....pounds...	9,250	8	740
Tar and pitch.....barrels...	7	5 14	36
Tobacco, chewing.....pounds...	14,014	14	1,962
Twine.....pounds...	25	24	6
Vinegar.....gallons...	1,466	9¾	143
Whiskey.....gallons...	2,154	47½	1,023
Wood, hard.....cords...	115	5 22	600
Total.....			98,493

Statement of the quantity and estimated value of articles of merchandise, of domestic growth and manufacture, exported from Portsmouth, New Hampshire, in the year ending December 31, 1855: *by* ZENAS CLEMENT, *Collector of Customs.*

ARTICLES.		Amount shipped to for'n ports.	Valuation.
Apples	barrels...	146	$208
Biscuit, or ship-bread	barrels...	5	32
Corn, shelled	bushels...	90	89
Corn-meal	bushels...	612	755
Cotton piece goods	pieces...	5	8
Flour	barrels...	317	3,091
Iron castings	tons...	2	174
Pork	barrels...	5	109
Rum	gallons...	394	165
otal			4,631

Statement of the quantity and estimated value of articles of merchandise, of domestic growth and manufacture, exported from Westville, Indiana, in the year ending December 31, 1855: *by* G. W. CRAWFORD, *Collector of Customs, at La Porte.*

ARTICLES.		Am't conveyed coastward by lake.	Valuation.
Cattle	number...	10	.....
Corn, shelled	bushels...	66,613	.....
Hogs, live	number...	450	.....
Hogs, dead	number...	400	.....
Horses	number...	8	.....
Oats	bushels...	2,300	.....
Potatoes, common	bushels...	2,984	.....
Wheat	bushels...	11,676	.....
Wool	pounds...	600	.....
Other articles			560 00

Statement of the quantity and estimated value of articles of merchandise, of domestic growth and manufacture, exported from Plymouth, North Carolina, in the year ending December 31, 1855: *by* J. HANNY, *Collector of Customs.*

ARTICLES.		Amount shipped to for'n ports.	Average prices.	Valuation.
Lumber, pine	M. feet...	1,500	$18 66	$280 00
Peas	bushels...	194	1 16	226 33
Shingles	thousand...	5,122	2 71	13,880 62
Staves and heading	thousand...	372	20 00	7,440 00
Tar and pitch	barrels...	144	2 14	308 67
Total				22,135 62

Statement of the quantity and estimated value of articles of merchandise, of domestic growth and manufacture, exported from Philadelphia, Pennsylvania, in the year ending December 31, 1855: *by* CHARLES BROWN, *Collector of Customs.*

ARTICLES.	Am't shipped to foreign ports.	Total Amount.	Valuation
Apples.....barrels...	801	801	$1,587
Bacon, hams.....pounds...	5,071,567	5,071,567	452,187
Beef, salt.....barrels...	1,745	1,745	195,611
Beef, salt.....tierces...	5,467	5,467	
Beeswax.....pounds...	27,477	27,477	7,466
Biscuit or ship-bread.....barrels or kegs...	22,550	22,550	88,092
Butter.....pounds...	349,897	349,897	61,310
Candles.....pounds...	618,994	618,994	109,026
Cattle.....number...	8	8	430
Cheese.....pounds...	58,110	58,110	6,550
Coal, anthracite.....tons...	20,103	20,103	94,806
Cordage and cables.....pounds...	11,984	11,984	1,554
Corn, shelled.....bushels...	686,252	686,252	683,732
Corn-meal.....barrels...	95,168	95,168	465,204
Cotton.....bales...	368	368	14,282
Cotton goods, printed or colored.....yards...	.....	.....	73,924
Cotton goods, uncolored.....yards...	.....	.....	72,112
Flour.....barrels...	218,197	218,197	1,962,618
Hogs, live.....number...	100	100	500
Hops.....pounds...	19,672	.....	6,012
Horses.....number...	2	.....	500
Iron nails.....pounds...	432,900	.....	16,495
Iron, other manufactures of.....	.....	.....	197,935
Lard.....pounds...	1,023,699	.....	119,727
Oil, lard.....gallons...	8,828	.....	7,496
Oil, linseed.....gallons...	756	.....	723
Pork.....tierces and barrels...	7,680	.....	149,856
Potatoes, common.....bushels...	5,034	.....	3,202
Rice.....tierces...	1,749	.....	56,943
Rosin.....barrels...	26,907	.....	46,113
Rye.....bushels...	41,771	.....	51,149
Rye-meal.....barrels...	12,757	.....	86,238
Sheep and lambs.....number...	62	.....	229
Snuff.....pounds...	17,187	.....	2,608
Spirits of turpentine.....gallons...	21,077	.....	10,446
Tallow.....pounds...	746,289	.....	97,430
Tar and pitch.....barrels...	1,560	.....	4,478
Tobacco, chewing.....pounds...	194,865	.....	20,278
Vinegar.....gallons...	59,110	.....	6,354
Wheat.....bushels...	226,071	.....	451,921
Total.....			5,627,124

Statement of the quantity and estimated value of articles of merchandise, of domestic growth and manufacture, exported from Roselle, Indiana, in the year ending December 31, 1855: *by* G. W. CRAWFORD, *Collector of Customs, at La Porte.*

ARTICLES.	Am't con'd coastward by lake.	Valuation
Corn, shelled.....bushels...	24,000	.....
Oats.....bushels...	6,000	.....
Pork.....barrels...	333	.....
Wheat.....bushels...	5,000	.....
Other articles.....		600 00

Statement of the quantity and estimated value of articles of merchandise, of domestic growth and manufacture, exported from Oswego, New York, in the year ending December 31, 1855: *by* E. B. TALCOTT, *Collector of Customs.*

ARTICLES.	Am't conveyed coastward by river or canal.	Am't conveyed coastward by railroad or by land.	Am't shipped to foreign ports.	Total amount.	Av'rage prices.	Valuation.
Alcohol.....gallons	10,131	.....	.....	10,131	$1 00	$10,131 00
Apples.....barrels	1,414	.....	8,256	9,670	1 00	9,670 00
Ashes, pot.....pounds	203,500	.....	.....	203,500	5	10,175 00
Bacon, assorted..... hogsheads & casks.	908	.....	.....	908	60 00	54,480 00
Bacon, hams..... hhds. and tierces...	.....	.....	15	15	64 66⅔	996 90
Barley.....bushels	25,710	.....	.....	25,710	1 00	25,710 00
Beef, salt.....barrels	1,058	.....	.....	1,058	14 00	14,812 00
Bricks, com'n..thousand	432½	.....	.....	432½	6 00	2,595 00
Butter.....pounds	5,600	.....	1,600	7,200	21¼	1,530 00
Candles.....pounds	.....	1,100	29,594	30,694	15¾	4,839 30
Cheese.....pounds	5,300	.....	23,082	28,382	10	2,838 20
Cider.....barrels	4	.....	.....	4	2 00	8 00
Coal, anthracite.....tons	.....	.....	13,694	13,694	7 00	95,858 00
Coal, bituminous....tons	943	.....	6,847	7,790	6 25	48,687 50
Cordage & cables.pounds	.....	.....	68,330	68,330	20	13,666 00
Corn, shelled....bushels	2,131,604	710,534	46,917	2,889,055	87½	2,527,923 12
Corn meal.....barrels	.....	.....	3,372	3,372	4 00	13,488 00
Cotton goods, printed or colored.....	.....	.....	.....	.....	.....	76,382 00
Cotton goods, uncol'd yards	.....	18,600	16,925	35,525	9	3,188 26
Earthenware.....	.....	.....	.....	.....	.....	13,869 00
Flaxseed.....bushels	.....	84	.....	84	1 50	126 00
Flour.....barrels	7,945	3,972	87,614	99 731	8 50	846,031 50
Fox skins.....number	.....	300	.....	300	75	225 00
Gin.....gallons	64	.....	.....	64	3 00	192 00
Gipsum.....tons	.....	.....	3,950	3,950	60	2,370 00
Gipsum, ground..barrels	.....	.....	11,217	11,217	1 00	11,217 00
Hemp, common..pounds	.....	10,000	.....	10,000	10	1,000 00
Hides.....number	875	.....	3,480	4,355	2 75	11,976 25
Hoops.....number	3,580,600	.....	.....	3,580,600	[illegible]	14,322 40
Hops.....pounds	12,400	.....	.....	12,400	30	3,720 00
Horses.....number	.....	.....	438	438	70 00	30,660 00
Iron, pig.....tons	369	.....	.....	369	100 00	36,900 00
Iron, bar.....pounds	20,000	.....	.....	20,000	8	1,600 00
Iron castings.....tons	18	.....	318	336	200 00	67,200 00
Lard.....pounds	268,662	134,333	.....	402,995	12	48,359 40
Lard.....kegs	.....	.....	1	1	15 00	15 00
Leather.....rolls	.....	.....	9,501	9,501	4 00	38,004 00
Lime.....barrels	230	.....	.....	230	62½	143 75
Lumber, pine.....feet	4,489,545	52,600	34,000	4,576,145	[illegible]	54,913 74
Lumber, hemlock....feet	330,000	.....	.....	330,000	[illegible]	2,640 00
Lumber, oak.....feet	469,000	.....	.....	469,000	[illegible]	9,380 00
Marble, quarried....tons	3	.....	4,874	4,877	20 00	97,540 00
Molasses.....gallons	.....	.....	87,352	87,352	55	48,043 60
Oats.....bushels	168,921	.....	.....	168,921	45	76,014 45
Oil, linseed.....gallons	850	.....	.....	850	1 00	850 00
Onions.....bushels	.....	.....	5	5	3	15 00
Peas.....bushels	384	.....	.....	384	1 00	384 00
Pork....tierces & barrels	3,799	.....	964	4,763	17 00	80,971 00
Potatoes, com'n..bushels	200	.....	11	211	1 20	253 20
Rice.....tierces	.....	.....	653	653	30 00	19,590 00

STATEMENT—Concluded.

ARTICLES.	Am't conveyed coastward by river or canal.	Am't conveyed coastward by railroad or by land.	Am't shipped to foreign ports.	Total Amount.	Av'rage Prices.	Valuation.
Rosin.....barrels	.....	.....	2,334	2,334	$5 00	$11,670 00
Rye.....bushels	3,000	2,452	.....	5,452	1 00	5,452 00
Salt.....bushels	.....	.....	610,730	610,730	.....	244,292 00
Snuff.....pounds	.....	.....	39,059	39,059	23½	9,178 86
Staves & head'g.....M.	1,429	.....	.....	1,429	30 00	42,870 00
Sugar, cane.....pounds	.....	.....	2,728,006	2,728,006	9	245,520 54
Tallow.....pounds	6,000	2,700	16,320	25,020	10½	2,627 10
Tar and pitch....barrels	.....	.....	386	386	5 50	2,123 00
Tobacco leaf.....pounds	1,800	.....	.....	1,800	10	180 00
Tobacco, chew'g.pounds	.....	.....	579,629	579,629	30	173,888 70
Vinegar.....gallons	.....	.....	2,355	2,355	24	565 20
Wheat.....bushels	3,166,800	1,055,599	.....	4,222,399	2 00	8,444,798 00
Whiskey .....gallons	572	.....	.....	572	38	217 36
Wood, hard.....cords	546¼	.....	.....	546¼	3 00	1,638 75
Wool.....pounds	78,900	.....	.....	78,900	20	15,780 00
Total.....						13,711,136 91½

Statement of the quantity and estimated value of articles of merchandise, of domestic growth and manufacture, exported from Marblehead, Massachusetts, in the year ending December 31, 1855: *by* WILLIAM BARTOLL, *Collector of Customs.*

ARTICLES.	Amount shipped to foreign ports.	Average prices.	Valuation.
Corn-meal.....barrels...	48	4 36	$209
Flour.....barrels...	563	9 17	5,163
Molasses.....gallons...	30	30	9
Pork.....tierces and barrels...	1	22 00	22
Tobacco, chewing.....pounds...	120	25	30
Total.....			5,433

Statement of the quantity and estimated value of articles of merchandise, of domestic growth and manufacture, exported from Key West, Florida, in the year ending December 31, 1855: *by* JOHN P. BALDWIN, *Collector of Customs.*

ARTICLES.	Amount conveyed coastward.	Amount shipped to for'n ports.	Total amount.	Average prices.	Valuation.
Arrowroot.....pounds...	56,137	100	56,237	$0 07	$3,396 59
Bacon, assorted...hhds. and casks...	.....	14	14	48 00	672 00
Bananas.....bunches...	500	.....	500	50	250 00
Beans.....bags...	5	.....	5	4 00	20 00
Beef, salt.....barrels...	.....	10	10	10 50	105 00
Butter.....firkins...	.....	37	37	5 00	185 00
Cattle.....number...	.....	227	227	15 00	3,405 00
Coco-nuts.....number...	6,000	.....	6,000	5	300 00
Corn, shelled.....bushels...	.....	1,000	1,000	95	950 00
Cotton.....bales...	197	.....	197	80 00	15,760 00
Cranberries.....bushels...	375	.....	375	55	206 25
Fish, salted.....tons...	.....	300	300	80 00	24,000 00
Fish, salted.....barrels...	400	.....	400	6 00	2,400 00
Flour.....barrels...	.....	235	235	10 50	2,467 50
Grapes.....pounds...	200	.....	200	30	60 00
Hemp, Sisal.....pounds...	3,240	.....	3,240	10	324 00
Hides.....number...	481	.....	481	1 00	481 00
Lemons.....barrels...	240	.....	240	5 00	1,200 00
Pork.....tierces and barrels...	.....	20	20	16 30	326 00
Rice.....tierces...	.....	60	60	9 00	540 00
Salt.....bushels...	15,000	.....	15,000	30	4,500 00
Shingles.....thousand...	.....	140	140	2 75	385 00
Sponge.....pounds...	49,076	.....	49,076	40	19,630 40
Tallow.....pounds...	2,200	.....	2,200	10	220 00
Turtles.....number...	505	.....	505	6 00	3,030 00
Turtle-shell.....pounds...	240	.....	240	4 00	960 00
Total.....					$118,389 74

Statement of the quantity and estimated value of articles of merchandise, of domestic growth and manufacture, exported from Machias, Maine, in the year ending December 31, 1855: *by* DANIEL W. DONNAN, *Collector of Customs.*

ARTICLES.	Amount conveyed coastward.	Amount shipped to for'n ports.	Total amount.	Av'ge prices.	Valuation.
Laths.....number...	66,000,000	.....	66,000,000	$ 1	$660,000
Lumber, pine.....feet...	30,619,000	2,381,000	3,300,000	1	33 000
Lumber, other.....feet...	.....	.....	.....	.....	3,513
Rags, paper.....tons...	17	.....	17	80 00	1,360
Shingles.....number...	1,000,000	.....	1,000,000	2½	2,500
Total.....					$700,373

Statement of the quantity and estimated value of articles of merchandise, of domestic growth and manufacture, exported from Washington, North Carolina, in the year ending December 31, 1855: *by* H. F. HANCOCK, *Collector of Customs.*

ARTICLES.	Am't conveyed coastward by river or canal.	Am't shipp'd to foreign ports.	Total Amount.	Av'rage Prices.	Valuation.
Beans.....bushels...	191	.....	191	$1 00	$191 00
Beeswax.....pounds...	12,030	.....	12,030	25	3,007 50
Copper, sheet.....pounds...	7,550	.....	7,550	20	1,510 00
Corn, shelled.....bushels...	232,742	.....	232,742	70	162,919 40
Cotton.....bales...	8,705	.....	8,705	35 00	304,675 00
Eggs.....number...	10,000	.....	10,000	1	100 00
Flaxseed.....bushels...	104	.....	104	1 00	104 00
Hides.....number...	4,813	.....	4,813	2 00	9,626 00
Iron, bar.....pounds...	21,000	.....	21,000	1½	315 00
Lumber, pine.....feet...	4,000,000	1,005,598	5,005,598	14	70,078 37
Molasses.....gallons...	500	.....	500	25	125 00
Oats.....bushels...	3,800	.....	3,800	35	1,330 00
Peas.....bushels...	979	.....	979	75	734 25
Rags, paper.....pounds...	79,000	.....	79,000	3	2,370 00
Rice.....tierces...	234	.....	234	15 00	3,510 00
Rosin.....barrels...	30,748	.....	30,748	1 33	40,997 33
Spts. of turpentine.....gallons...	262,920	1,010	263,930	40	105,572 00
Staves and heading.....number...	10,500	1,086,180	1,096,680	2	21,933 60
Tar and pitch.....barrels...	106,880	336	107,216	2 25	241,236 00
Wheat.....bushels...	25,205	.....	25,205	2 00	50,410 00
Total.....					$1,020,744 45

Statement of the quantity and estimated value of articles of merchandise, of domestic growth and manufacture, exported from the city of La Porte, Indiana, in the year ending December 31, 1855: *by* G. W. CRAWFORD, *Collector of Customs, at La Porte.*

ARTICLES.	Amount conveyed coastward by lake.	Average Prices.	Valuation.
Cattle.....number...	6,591	$50 00	$329,550 00
Corn, shelled.....bushels...	387,035	62½	241,896 87½
Fruit.....barrels...	945	2 00	1,890 00
Hogs, live.....number...	1,715	6 50	11,147 50
Horses.....number...	579	100 00	57,900 00
Pork.....barrels...	291	16 00	4,656 00
Sheep and lambs.....number...	1,046	2 50	2,615 00
Wheat.....bushels...	256,578	1 50	384,867 00
Wool.....pounds...	58,300	32	18,656 00
			1,053,178 37½
Other articles.....			15,000 00
Total.....			$1,068,178 37½

Statement of the quantity and estimated value of articles of merchandise, of domestic growth and manufacture, exported from New York, in the year ending December 31, 1855: *by* H. J. REDFIELD, *Collector of Customs.*

ARTICLES.		Am't shipped to foreign ports.	Valuation.
Alcohol	gallons...	23,170	$15,383
Apples	barrels...	2,460	9,275
Ashes, pot and pearl	tons...	3,395	439,739
Bacon	pounds...	17,224,923	1,521,263
Bark, oak	cords...	.....	38,646
Beef, salt	barrels...	25,062	1,370,880
Beef, salt	tierces...	37,046	
Beeswax	pounds...	157,400	42,989
Biscuit or shipbread	barrels and kegs...	55,379	214,701
Bricks, common	number...	.....	19,068
Butter	pounds...	1,083,070	220,397
Candles	pounds...	1,706,036	320,696
Cheese	pounds...	6,128,960	654,839
Clover seed	pounds...	.....	17,731
Coal, anthracite	tons...	16,266	91,404
Coal, bituminous			
Copper ore	tons...	.....	547,651
Copper, pig	pounds...		
Copper pipe	pounds...		
Copper sheet	pounds...		
Cordage and cables	pounds...	986,000	127,565
Corn, shelled	bushels...	3,806,989	3,811,245
Corn meal	barrels...	58,185	297,149
Cotton	bales...	273,674	12,057,905
Cotton goods, printed or colored	yards...	.....	149,353
Cotton goods, uncolored	yards...	.....	1,378,429
Earthenware		.....	8,341
Flour	barrels...	990,563	9,018,673
Ginseng	pounds...	72,740	38,876
Hemp, common	pounds...	60,400	6,546
Hides	number...	27,764	117,782
Hogs, live	number...	4	35
Hops	pounds...	1,592,286	419,520
Horses	number...	110	20,080
Iron castings and other manufactures of iron		.....	1,250,450
Lard	pounds...	8,694,720	963,798
Leather	pounds...	914,757	156,759
Lumber, pine	feet...	29,478	635,174
Lumber, hemlock	feet...		
Lumber, poplar	feet...		
Lumber, oak	feet...		
Lumber, maple	feet...		
Lumber, black walnut	feet...		
Lumber, cherry	feet...		
Molasses	gallons...	33,240	8,464
Oil, lard	gallons...	90,786	76,454
Oil, linseed	gallons...	25,687	23,646
Onions	bushels...	.....	21,950
Onions	bunches...		
Paint, mineral	pounds...	.....	68,138
Pork	tierces...	2,997	2,517,165
Pork	barrels...	143,004	
Potatoes, common	barrels...	22,590	50,111
Rice	tierces...	13,628	612,466
Rice	barrels...	11,591	
Rosin	barrels...	505,950	1,214,574
Rum	gallons...	1,414,255	684,534

STATEMENT—Continued.

ARTICLES.		Am't shipped to foreign ports.	Valuation.
Rye	bushels...	650,000	$824,885
Rye meal	barrels...	20,100	133,381
Sheep and lambs	number...	1,781	11,317
Snuff	pounds...	14,380	1,424
Spirits of turpentine	gallons...	1,619,649	778,359
Staves and heading	thousand...	19,512	1,324,596
Sugar, cane	pounds...	577,635	35,734
Tallow	pounds...	1,964,713	239,630
Tar and pitch	barrels...	60,467	192,408
Tobacco, leaf	hogsheads...	6,868	
Tobacco, strips	bales...	8,514	1,030,515
Tobacco stems	cases...	5,244	
Tobacco, chewing	pounds...	5,426,021	934,106
Vinegar	gallons...	25,815	3,281
Wheat	bushels...	3,455,234	6,952,393
Whiskey	gallons...	55,826	36,514
Total			53,756,387

Statement of the quantity and estimated value of articles of merchandise, of domestic growth and manufacture, exported from Providence, Rhode Island, in the year ending December 31, 1855: *by* G. BRADFORD, *Collector of Customs.*

ARTICLES.		Amount shipped to foreign ports.	Valuation.
Bacon, hams	pounds...	579	$ 67
Beef, salt	barrels...	39	605
Biscuit	barrels...	50	287
Bricks, fire	number...	4,000	26
Butter	pounds...	254	84
Corn meal	barrels...	4	15
Cotton goods, colored	yards...	87,228	8,436
Cotton goods, uncolored	yards...	771,388	44,677
Flannel, cotton	yards...	22,527	1,593
Flour	barrels...	102	990
Hoops	thousand...	1,180,751	30,243
Lumber, pine	feet...	245,527	4,057
Nails, cut	pounds...	60,200	2,408
Onions	bushels...	45	90
Pickles	boxes...	28	68
Pork	barrels...	17	255
Potatoes	bushels...	405	301
Rosin	barrels...	600	1,125
Shingles, pine and cedar	thousand...	171,375	658
Shooks and heading	thousand...	2,742	6,784
Spirits of turpentine	gallons...	2,400	1,515
Staves	number...	20,000	1,000
Stoves	number...	72	808
Tobacco	pounds...	30,000	3,000
Vinegar	gallons...	3,881	499
Total			109,591

Statement of the quantity and estimated value of articles of merchandise, of domestic growth and manufacture, exported from Mobile, Alabama, in the year ending December 31, 1855: *by* T. SANFORD, *Collector of Customs.*

ARTICLES.	Amount conveyed by river.	Am't conveyed coastwise by sea.	Am't shipped to foreign ports.	Total Amount.	Average Prices.	Valuation.
Bricks, common.....thousand..	.....	2,260	.....	2,260	$7 20	$ 16,272 00
Cotton.....pounds..	.....	63,244,815	189,774,382	253,019,197	9	22,771,727 73
Hides.....number..	10,230	12,136	.....	22,366	2 44	54,573 04
Lumber, pine.....thousand..	.....	7,630	7,284	14,914	10 25	152,868 50
Lumber, pine, hewn.....tons..	.....	.....	1,660	1,660	6 85	11,371 00
Masts and spars.....number..	.....	.....	1,588	1,588	91 50	145,302 00
Oysters.....bushels..	26,500	.....	.....	26,500	80	21,200 00
Oysters.....gallons..	2,000	.....	.....	2,000	2 00	4,000 00
Rosin.....barrels..	.....	5,592	6,700	12,292	1 50	18,438 00
Spirits of turpentine...gallons..	.....	54,000	.....	54,000	50	27,000 00
Staves.....thousand..	.....	.....	104	104	49 65	5,163 60
Tallow.....pounds..	.....	.....	8,800	8,800	10	880 00
Tar and pitch.....barrels..	.....	1,500	.....	1,500	2 00	3,000 00
Total.....						$ 23,231,795 87

Statement of the quantity and estimated value of articles of merchandise, of domestic growth and manufacture, exported from Galveston, Texas, in the year ending December 31, 1855: *by* H. STUART, *Collector of Customs.*

ARTICLES.	Amount conveyed coastward.	Amount shipped to for'gn ports	Total Amount.	Average Prices.	Valuation.
Cattle.....number...	4,361	.....	4,361	$16 00	$69,776 00
Cotton.....bales...	68,853	8,100	76,953	35 00	2,693,355 00
Hides.....number...	20,517	.....	20,517	4 00	82,068 00
Molasses.....gallons...	84,945	.....	84,945	25	21,236 25
Sugar, cane.....pounds...	1,934,710	.....	1,934,710	7	135,429 70
Total.....					$3,001,864 95

Statement of the quantity and estimated value of articles of merchandise, of domestic growth and manufacture, exported from Haskels, Indiana, in the year ending December 31, 1855: *by* G. W. CRAWFORD, *Collector of Customs at La Porte.*

ARTICLES.	Amount conveyed coastward by lake.	Valuation.
Corn, shelled.....bushels...	15,000	.....
Oats.....bushels...	6,085	.....
Wheat.....bushels...	1,000	.....
Other articles.....	.....	$200 00

Statement of the quantity and estimated value of articles of merchandise, of domestic growth and manufacture, exported from Rochester, New York, in the year ending December 31, 1855: *by* JAMES C. CAMPBELL, *Collector of Customs.*

ARTICLES.	Am't shipp'd to foreign ports by river and lake.	Average prices.	Valuation.
Apples.....barrels...	7,281	$1 87	$13,615 47
Barley.....bushels...	6	2 50	15 00
Bricks, common.....thousand ..	221	5 00	1,105 00
Buffalo robes, dressed.....number...	88	15 00	1,320 00
Butter.....pounds...	4,754	19	903 26
Calves.....number...	7	3 57	24 99
Candles.....pounds...	4,446	15	666 90
Cattle.....number...	2	20 00	40 00
Cheese.....pounds...	80,572	8	6,445 76
Cider.....barrels...	108	9 87	1,065 96
Cordage and cables.....pounds...	10,561	14	1,478 54
Corn, shelled.....bushels...	108	1 00	108 00
Corn meal.....bushels...	100	74	74 00
Earthenware.....	.....	.....	570 00
Feathers.....pounds...	4,175	20	835 00
Flour.....barrels...	754	10 19	7,683 26
Hides.....number...	542	3 23	1,750 66
Hops.....pounds...	2,369	15	355 35
Horses.....number...	42	154 76	6,499 92
Iron, pig.....pounds...	283,400	1½	4,251 00
Iron castings.....tons...	516	120 00	619 20
Lead pipe.....pounds...	8,636	5	431 80
Leather.....rolls...	87	37 11	3,228 57
Lumber, black walnut.....thousand...	52	42 00	2,184 00
Molasses.....gallons...	10,921	40	4,368 40
Oats.....bushels...	118	40	47 20
Onions.....bushels...	318	1 14	362 52
Pork.....tierces and barrels...	141	13 67	1,927 47
Potatoes, common.....bushels...	436	65	283 40
Rice.....tierces...	14	35 50	497 00
Rum.....gallons...	36	24 64	887 04
Salt.....bushels...	261	75	195 75
Sheep and lambs.....number...	104	2 74	284 96
Snuff.....pounds...	400	25	100 00
Staves and heading.....number...	30,000	6	1,800 00
Tallow.....pounds...	8,966	$0 12	1,075 92
Tar and pitch.....barrels...	2	10 00	20 00
Tobacco, chewing.....pounds...	22,480	20	4,496 00
Vinegar.....gallons...	2,020	23	464 60
Wheat.....bushels...	56	2 00	112 00
Whiskey.....gallons...	23,821	44	10,481 24
Wool.....pounds...	1,680	25	420 00
			$136,040 28

Statement of the quantity and estimated value of articles of merchandise, of domestic growth and manufacture, exported from Holmesville, Indiana, in the year ending December 31, 1855: *by* G. W. CRAWFORD, *Collector of Customs at La Porte.*

ARTICLES.	Amount conveyed coastward by lake.	Valuation.
Corn, shelled.....bushels...	55,576	.....
Wheat.....bushels...	19,036	.....
Other articles.....	.....	$1,100 00

Statement of the quantity and estimated value of articles of merchandise, of domestic growth and manufacture, exported from Milwaukie, Wisconsin, in the year ending December 31, 1855: *by* JOHN WHITE, *Collector of Customs.*

ARTICLES.	Am't conveyed coastward by river or canal.	Am't conveyed coastward by railroad or by land.	Am't conveyed inland.	Am't shipped to foreign ports.	Total Amount.	Average Prices.	Valuation
Apples.....barrels..	1,600	.....	15,000	.....	16,600	$ 2 25	$ 37,350 00
Ashes, pot.....tons..	400	.....	.....	.....	400	100 00	40,000 00
Ashes, pearl.....tons..	500	.....	.....	.....	500	100 00	50,000 00
Bacon, assorted.....boxes..	1,000	.....	.....	.....	1,000	30 00	30,000 00
Bacon, ass'd..hhds. & casks..	13,528	.....	.....	.....	13,528	50 00	676,400 00
Bacon hams..hhds. & tierces..	5,100	.....	.....	.....	5,100	60 00	306,000 00
Bacon, in bulk.....pounds..	.....	.....	.....	215,250	215,250	9	19,372 50
Barley.....bushels..	86,000	.....	.....	.....	86,000	1 20	103,200 00
Beans.....bushels..	5,900	.....	.....	.....	5,900	2 25	13,275 00
Beef, salt.....barrels..	16,800	.....	.....	.....	16,800	11 00	184,800 00
Beef, salt.....tierces..	5,300	.....	.....	.....	5,300	16 50	87,450 00
Bricks, common...thousand..	6,500	.....	.....	.....	6,500	10 00	65,000 00
Butter.....pounds..	450,000	.....	.....	.....	450,000	18	81,000 00
Butter.....firkins..	3,520	.....	.....	.....	3,520	16 00	56,320 00
Calves.....number..	.....	.....	.....	.....	.....	.....	1,712,577 00
Candles.....pounds..	150,000	.....	.....	.....	150,000	15	22,500 00
Cattle.....number..	2,715	.....	.....	.....	2,715	50 00	135,750 00
Corn, shelled.....bushels..	117,000	.....	.....	.....	117,000	60	70,200 00
Corn meal.....bushels..	177,850	.....	.....	.....	177,850	75	133,387 50
Cranberries.....bushels..	5,000	.....	.....	.....	5,000	5 00	25,000 00
Eggs.....number..	1,500,000	.....	.....	.....	1,500,000	1	15,000 00
Flour.....barrels..	181,989	35,354	.....	18,278	235,621	8 00	1,884,968 00
Hides.....number..	15,000	.....	.....	.....	15,000	4 50	67,500 00
Hogs, live.....number..	5,000	.....	.....	.....	5,000	10 00	50,000 00
Hops.....pounds..	40,000	.....	.....	.....	40,000	15	6,000 00
Iron, pig.....tons..	616	.....	.....	.....	616	37 00	22,792 00
Lard.....pounds..	.....	.....	.....	160,000	160,000	10	16,000 00
Lard.....kegs..	11,286	.....	.....	.....	11,286	10 00	112,860 00
Lead, bar.....pounds..	75,000	.....	.....	.....	75,000	7	5,250 00
Lead, pig.....pounds..	450,000	.....	.....	.....	450,000	6½	29,250 00
Leather.....rolls..	1,975	.....	.....	.....	1,975	40 00	79,000 00
Lime.....barrels..	14,040	5,960	.....	.....	20,000	2 00	40,000 00
Oats.....bushels..	124,980	.....	.....	.....	124,980	40	49,992 00
Onions.....bushels..	2,400	.....	.....	.....	2,400	50	1,200 00
Peas.....bushels..	2,300	.....	.....	.....	2,300	1 25	2,875 00
Pelts, sheep or lambs..num'r..	9,500	.....	.....	.....	9,500	65	6,175 00
Po k.....tierces and bbls..	51,691	.....	.....	3,946	55,637	17 00	945,829 00
Pork in bulk.....pounds..	1,125,000	.....	.....	.....	1,125,000	6¼	70,312 50
Potatoes, common..bushels..	42,373	.....	.....	.....	42,373	75	31,779 75
Rye.....bushels..	69,600	.....	.....	.....	69,600	1 00	69,600 00
Salt.....bushels..	.....	.....	225,000	.....	225,000	40	90,000 00
Sheep and lambs...number..	3,500	8,400	.....	.....	11,900	3 50	41,650 00
Shot.....pounds..	255,033	.....	.....	.....	255,033	8	20,402 64
Staves and heading.....M..	900	600	.....	.....	1,500	14 00	21,000 00
Timothy seed.....bushels..	9,500	.....	.....	.....	9,500	2 50	23,750 00
Tobacco, leaf.....pounds..	125,000	.....	.....	.....	125,000	7	8,750 00
Turkeys.....number..	3,000	.....	.....	.....	3,000	1 00	3,000 00
Venison hams, dried.pounds..	20,000	.....	.....	.....	20,000	15	3,000 00
Vinegar.....gallons..	50,000	.....	.....	.....	50,000	20	10,000 00
Wheat.....bushels.	2,676,500	.....	.....	139,446	2,815,948	1 65	4,646,310 90
Whiskey.....gallons..	100,000	.....	.....	.....	.....	42	42,000 00
Wood, hard.....cords..	36,000	.....	.....	.....	36,000	3 50	126,000 00
Wool.....pounds..	552,000	.....	.....	.....	552,000	36	198,720 00
Total.....							12,590,548 79

Statement of the quantity and estimated value of articles of merchandise, of domestic growth and manufacture, exported from Dubuque, Iowa, in the year ending December 31, 1855: *by* G. R. WEST.

ARTICLES.	1854.		1855.		1855.			
	Amount of Tonnage.	Amount of Value.	Amount of Tonnage.	Amount of Value.	Increase of Tonnage.	Increase of Value.	Decrease of Tonnage.	Decrease of Value.
Bacon	30.00	$4,000 00	120.00	$16,000 00	90.00	$13,000 00	.....	.....
Barley	36.00	1,800 00	18.00	1,850 00	.....	50 00	18.00	.....
Bran and shorts	5.10	40 00	5.10	40 00	.....	.....	.....	.....
Butter and eggs	3.00	2,500 00	6.00	7,500 00	3.00	5,000 00	.....	.....
Cattle	650.00	52,650 00	1,300.00	105,300 00	650.00	52,650 00	.....	.....
Corn	100.00	1,000 05	150.00	1,530 00	50.00	500 03	.....	.....
Dry goods	265.00	300,000 00	795.00	900,000 00	530.00	600,000 00	.....	.....
Engines and castings	196.00	22,240 00	392.00	44,480 00	196.00	22,240 00	.....	.....
Flax seed	18.10	650 00	9.05	405 25	.....	.....	9.05	244 75
Flour	880.00	48,000 00	2,640.00	216,000 00	1,760.00	168,000 00	.....	.....
Fruit trees	1.00	800 00	1.10	1,200 00	10	400 00	.....	.....
Fruits, dried & green	33.00	2,000 00	99.00	9,000 00	66.00	7,000 00	.....	.....
Furs and skins	9.00	9,000 00	18.00	18,000 00	9.00	9,000 00	.....	.....
Glass, sash and doors	50.00	6,000 00	250.00	33,000 00	200.00	27,000 00	.....	.....
Groceries	780.00	194,000 00	3,120.00	776,000 00	2,340.00	582,000 00	.....	.....
Hardware & cutlery	120.00	32,000 00	240.00	64,000 00	120.00	32,000 00	.....	.....
Hides, dry	58.00	11,200 00	174.00	36,960 00	116.00	25,760 00	.....	.....
Hogs	6.00	400 00	36.00	3,600 00	30.00	3,200 00	.....	.....
Hops	21.00	21,000 00	26.05	13,125 00	5.05	.....	.....	7,875 00
Horses	135.00	31,025 50	270.00	62,051 00	135 00	31,025 50	.....	.....
Household furniture	720.00	24,720 00	2,880.00	98,880 00	2,160.00	74,160 00	.....	.....
Iron, steel and nails	1,200.00	192,000 00	2,400.00	384,600 00	1,200.00	192,000 00	.....	.....
Lard	34.00	6,000 00	136.00	24,000 00	102.00	18,000 00	.....	.....
Lead	4,385.00	526,200 00	5,262.00	631,440 00	877.00	105,240 00	.....	.....
Lime	180.00	1,200 00	60.00	400 00	.....	.....	120.00	800 00
Liquors, various	125.00	5,000 00	375.00	15,000 00	250.00	10,000 00	.....	.....
Oats	385.00	5,555 00	289.00	6,943 00	.....	1,388 00	96.00	.....
Plows	12.12	4,330 00	31.10	10,890 00	18.18	6,480 00	.....	.....
Pork	138.00	10,000 25	552.00	40,001 00	414.00	30,000 75	.....	.....
Potatoes	480.00	12,800 00	600.00	16,000 00	120.00	3,200 00	.....	.....
Reapers and mowers	5.00	1,500 00	15.00	4,500 00	10.00	3,000 00	.....	.....
Sheep	4.10	1,687 50	6.15	2,531 25	2.05	843 75	.....	.....
Stoves and pipe	330.00	3,600 00	60.00	7,200 00	30.00	3,600 00	.....	.....
Stone, caps and sills	20.00	300 00	40.00	900 00	40.00	600 00	.....	.....
Threshing machines	20.00	5,000 00	40.00	10,000 00	20.00	5,000 00	.....	.....
Wagons & carriages	60.00	15,220 00	180.00	45,660 00	120.00	30,440 00	.....	.....
Wheat	540.00	18,000 00	1,620.00	81,000 00	1,080.00	63,000 00	.....	.....
	12,034.42	$1,573,408 30	24,215.55	$3,689,266 50	12,944.18	$2,018,538 03	243.05	$8,919 75
			12,034.42	1,573,408 30	243.05	8,919 75		
			12,181.13	$2,115,858 20	12,701.13	$2,009,618 28		

The whole number of tons exported from Dubuque, on the Mississippi, in 1854, was 12,034½; value, $1,573,408 30. The tonnage for 1855 is 24,215½ tons; value, $3,689,266 50; making an increase of tonnage, in 1855, of 12,701⅛ tons exported. Increase of value, $2,009,618 28, equal to 134.47 per cent. on the value exported this year over 1854; and tonnage equal to 101.22 per cent.

Statement of the quantity and estimated value of Articles of Merchandise, of domestic growth and manufacture, exported from Jacksonville, Florida, in the year ending December 31, 1855: *by* JAMES G. DELL, *Collector of Customs.*

ARTICLES.	Amount conveyed to foreign ports.	Average Price.	Valuation.
Lumber, pine.....thousand feet...	9,020	$14 00	$126,280 00

Statement of the quantity and estimated value of articles of merchandise, of domestic growth and manufacture, exported from Franklin, Louisiana, in the year ending December 31, 1855: *by* R. W. McMILLAN, *Collector of Customs.*

ARTICLES.	Am't conveyed coastward or coastwise by river or canal.	Am't conveyed coastward or coastwise by railroad or by land.	Am't conveyed inland.	Total Amount.	Av'rage Prices.	Valuation.
Calves.....number	780	.....	420	1,200	$4 00	$4,800
Cattle.....number	1,450	.....	2,050	3,500	12 00	42,000
Cotton.....bales	.....	.....	.....	.....	.....	225,000
Eggs.....number	150,000	110,000	.....	260,000	12½	2,708
Fowls, common..number	500	850	.....	1,350	20	270
Hides.....number	3,000	2,500	.....	5,500	1 00	5,500
Lumber, live oak.....feet	10,000	.....	.....	10,000	4	400
Molasses.....gallons	1,720,000	.....	.....	1,720,000	25	430,000
Moss, Spanish.....pounds	60,000	.....	.....	60,000	2	1,200
Oranges .....,.number	100,000	6,000	.....	106,000	1	1,060
Rum.....gallons	4,800	.....	.....	4,800	40	1,920
Sugar, cane.....pounds	48,000,000	9,000,000	.....	57,000,000	6	3,420,000
Total.....						$4,134,858

Statement of the quantity and estimated value of articles of merchandise, of domestic growth and manufacture, exported from Georgetown, District of Columbia, in the year ending December 31, 1855: *by* ROBERT WHITE, *Collector of Customs.*

ARTICLES.	Quantity.	Value.	Total Amount.
Bacon, hams.....pounds...	445	$ 11	$ 49
Boards, white pine .....M. feet...	78	19 00	1,482
Butter .....pounds...	275	25	69
Cornmeal.....barrels...	392	4 00	1,568
Flour.....barrels...	2,550	9 17	23,384
Total.....			26,552

Statement of the quantity and estimated value of articles of merchandise, of domestic growth and manufacture, exported from Rolling Prairie, Indiana, in the year ending December 31, 1855: *by* G. W. CRAWFORD, *Collector of Customs at La Porte.*

ARTICLES.	Am't conveyed coastward by lake.	Valuation.
Corn, shelled.....bushels...	87,279	.....
Oats .....bushels...	4,321	.....
Pork.....barrels...	401	.....
Potatoes, common .....bushels...	579	.....
Wheat .....bushels...	31,393	.....
Wool .....pounds...	1,284	.....
Other articles.....	.....	510 00

Statement of the quantity and estimated value of articles of merchandise, of domestic growth and manufacture, exported from Toledo, Ohio, in the year ending December 31, 1855: *by* CHARLES R. DENNETT, *Deputy Collector of Customs.*

ARTICLES.	Am't conveyed coastward or coastwise by river or canal.	Am't shipped to foreign ports.	Total Amount.	Average Prices.	Valuation.
Alcohol.....gallons	987,720	.....	987,720	$0 30	$296,316 00
Apples, dried.....pounds	18,269	.....	18,269	12	2,192 28
Ashes, pot.....pounds	1,402,865	.....	1,402,865	5	70,143 25
Bacon, hams...hhds. and tierces	8,958	.....	8,958	30 00	268,740 00
Bacon, in bulk.....pounds	.....	140,500	140,500	10	14,050 00
Barley.....bushels	22,066	.....	22,066	80	17,652 80
Beans.....bushels	208	.....	208	1 00	208 00
Beef, salt.....barrels	9,623	.....	9,623	10 00	96,230 00
Beef, salt.....tierces	1,961	.....	1,961	25 00	49,025 00
Beeswax.....pounds	3,000	.....	3,000	20	600 00
Bricks, common.....number	15,985	.....	15,985	.5	79 93
Butter.....firkins	2,361	.....	2,366	8 00	18,928 00
Candles.....pounds	3,570	.....	3,570	15	535 50
Cattle.....number	10,674	.....	10,674	30 00	320,220 00
Cheese.....pounds	37,037	.....	37,037	10	3,703 70
Coal, bituminous.....tons	499	.....	499	5 00	2,495 00
Corn, shelled.....bushels	3,864,375	402,360	4,266,735	70	2,986,714 50
Cornmeal.....barrels	.....	180	180	7 00	1,260 00
Cotton.....pounds	35,824	.....	35,824	.....	.....
Cotton yarn.....pounds	11,577	.....	11,577	.....	.....
Earthenware.....	.....	.....	.....	.....	2,789 00
Eggs.....barrels	504	.....	504	.....	.....
Flour.....barrels	271,437	1,842	273,279	8 00	2,186,232 00
Hides.....number	23,084	.....	23,084	3 00	69,252 00
Hogs, live.....number	50,828	.....	50,828	9 00	457,452 00
Horses.....number	83	.....	83	100 00	8,300 00
Iron, pig and bar.....pounds	3,596,259	.....	3,596,259	.....	.....
Iron, railroad.....tons	12,499	.....	12,499	.....	.....
Lard.....pounds	4,312,600	26,894	4,339,494	10	433,949 40
Lard.....kegs	1,890	.....	1,890	.....	.....
Laths.....pieces	3,912,850	.....	3,912,850	.1	3,912 85
Lead, pig.....pounds	28,783	.....	28,783	.....	.....
Leather.....rolls	3,618	.....	3,618	.....	.....
Lumber, pine.....feet	8,792,000	.....	8,792,000	.....	.....
Lumber, oak.....feet	.....	312,600	312,600	1	3,126 00
Lumber, black walnut.....feet	.....	105,000	105,000	1.1	1,260 00
Marble, quarried.....tons	2,528	.....	2,528	.....	.....
Molasses.....gallons	24,000	.....	24,000	.....	.....
Oats.....bushels	44,154	.....	44,154	30	13,246 20
Oil, lard.....gallons	10,188	.....	10,188	80	8,150 40
Oil, linseed.....gallons	1,200	.....	1,200	90	1,080 00
Pork.....tierces and bbls.	45,116	2,931	48,047	25 00	1,201,175 00
Pork in bulk.....pounds	6,776,000	.....	6,776,000	6	406,560 00
Potatoes, common.....bushels	34,330	.....	34,330	50	17,165 00
Rye.....bushels	19,219	.....	19,219	1 00	19,219 00
Salt.....bushels	575,145	.....	575,145	30	172,543 50
Sheep and lambs.....number	11,121	.....	11,121	2 00	22,242 00
Staves and heading...thousand	2,428	.....	.....	.....	.....
Tallow.....pounds	.....	51,990	51,990	10	5,199 00
Tobacco, leaf.....pounds	14,607	.....	.....	.....	.....
Tobacco, chewing.....pounds	232,796	.....	.....	.....	.....
Wheat.....bushels	1,692,275	8,712	1,700,987	1 60	2,721,579 20
Wool.....pounds	1,196,000	.....	1,196,000	30	358,800 00
Total.....					$12,262,326 51

Statement of the quantity and estimated value of articles of merchandise, of domestic growth and manufacture, exported from Lewiston, New York, in the year ending December 31, 1855: *by* A. V. E. HOTCHKISS, *Collector of Customs.*

ARTICLES.	Amount shipped to foreign ports.	Average Prices.	Valuation.
Alcohol ..... gallons...	137,948	$0 40	$ 55,179
Apples ..... barrels...	4,448	1 50	6,672
Apples, dried ..... pounds...	46,288	6	2,777
Bacon, assorted ..... hogsheads and casks...	8	21 87½	175
Beans ..... bushels...	154	42	65
Bricks, fire ..... number...	.....	.....	23
Brooms ..... dozen...	1,217	2 17	2,640
Buffalo robes, dressed ..... number...	6	5 00	30
Butter ..... pounds...	9,268	20	1,853
Candles ..... pounds...	4,665	16	746
Carpets ..... yards...	1,650	48	792
Cattle ..... number...	31	73 00	2,263
Cheese ..... pounds...	106,031	11	11,663
Cider ..... barrels...	233	4 00	932
Clover seed, red ..... pounds...	77,340	10½	8,120
Coal, bituminous ..... tons...	21	5 70	120
Corn, shelled ..... bushels...	1,215	82	996
Corn meal ..... barrels...	14	4 00	56
Cotton goods, printed or colored ..... yards...	366,040	10	36,604
Cotton goods, uncolored ..... yards...	87,315	8	6,985
Earthenware ..... valuation...	.....	.....	2,898
Eggs ..... dozen...	1,400	10	140
Flour ..... barrels...	82	5 35	439
Fowls, common ..... number...	28	50	14
Gypsum ..... tons...	8	6 25	50
Gypsum, ground ..... barrels...	20	2 41	48
Hay ..... bales or tons...	7	7 43	52
Hemp, common ..... pounds...	423	8 44	3,570
Hides ..... number...	175	4 11	719
Hops ..... pounds...	6,757	39	2,635
Horses ..... number...	285	134 00	38,190
Iron, bar ..... pounds...	2,816	9	253
Iron castings ..... tons...	137	60 00	8,220
Lard ..... pounds...	10,308	10	1,031
Leather ..... rolls...	120	20 96	2,515
Lime ..... barrels...	786	1 00	786
Lumber, oak ..... feet...	25,000	1½	375
Molasses ..... gallons...	6,847	37	2,533
Oats ..... bushels...	5,080	40	2,032
Oil, lard ..... gallons...	1,400	1 13	1,582
Onions ..... bushels...	441	1 00	441
Oysters ..... gallons...	200	1 90	380
Paint, mineral ..... pounds...	39,337	8	3,147
Pork ..... tierces and barrels...	120	15 60	1,872
Potatoes, common ..... bushels...	112	1 00	112
Rice ..... tierces...	15	44 00	660
Rosin ..... barrels...	36	3 30	119
Rum ..... gallons...	221	2 26	499
Rye meal ..... barrels...	12	4 16	50
Salt ..... bushels...	178	35	62
Satinet ..... yards...	61,500	48	29,520
Sheep and lambs ..... number...	469	3 65	1,712
Snuff ..... pounds...	500	20	100
Spirits of turpentine ..... gallons...	814	80	651
Staves and heading ..... M...	76	7 40	562

STATEMENT—Continued.

ARTICLES.	Amount shipped to foreign ports.	Average Prices.	Valuation.
Tallow.....pounds...	222,482	$0 12½	$27,810
Tar and pitch.....barrels...	169	10 44	1,764
Timothy seed.....bushels...	2,638	1 45	3,825
Tobacco, leaf.....pounds...	77,800	10	7,780
Tobacco, chewing.....pounds...	41,956	24	10,069
Vinegar.....gallons...	714	29	207
Wine.....gallons...	27	88	24
Wood, hard.....cords...	510	2 25	1,148
Total.....			299,287

Statement of the quantity and estimated value of articles of merchandise, of domestic growth and manufacture, exported from the port of Grand Haven, Michigan, in the year ending December 31, 1855: *by Messrs.* CUTLER & WARTS *and* TERRY & SONS.

ARTICLES.	Amount conveyed coastward by lake.	Valuation.
Bedsteads.....dozen...	60	$1,500
Canal boats.....	2	1,800
Felloes.....bundles...	160	.....
Flour.....barrels...	22,807	205,263
Ground feed.....bags...	447	447
Hemlock bark.....cords...	500	2,000
Hoops.....M...	20	200
Hubs, wagon.....	11,740	1,174
Laths.....pieces...	15,000,000	33,000
Leather.....packages...	2,190	42,190
Lumber.....feet...	45,000,000	450,000
Merchandise.....tons...	196	90,000
Pails..... dozen...	542	1,355
Paper rags.....pounds...	56,750	2,270
Plaster.....barrels...	11,646	11,646
Salæratus.....pounds...	64,822	3,989
Sawed staves.....bundles...	2,086	1,000
Shingles.....number...	40,000,000	100,000
Ship knees.....	250	1,000
Spokes, wagon.....	11,250	1,100
Staves.....	.....	30,400
Stucco.....barrels...	6,008	21,028
Timber.....M. feet...	30	1,800
Tubs.....dozen...	452	4,000
Wheat.....bushels...	76,430	152,860
White fish.....half barrels...	1,135	4,540
Wool.....pounds...	65,972	32,986
Wood.....cords...	1,511	3,022
Total.....		1,200,570

Statement of the quantity and estimated value of articles of merchandise, of domestic growth and manufacture, exported from Perth Amboy, New Jersey, in the year ending December 31, 1855: *by* FRANK W. BRINLEY, *Collector of Customs.*

ARTICLES.	Am't conveyed coastward or coastwise by river or bay.	Av'rage Prices	Valuation.
Apples.....barrels...	14,500	$2 00	$29,000
Apples, dried.....pounds...	40,000	4½	18,000
Bacon hams.....number...	1,500,000	1 25	18,750
Barley.....bushels..	7,000	70	4,900
Beans.....bushels...	7,000	71⅓	4,993
Beeswax.....pounds...	1,500	25	375
Bricks, common.....number...	9,000,000	4 50	40,500
Bricks, fire.....number...	4,000,000	35 00	140,000
Brooms.....number...	25,000	12	3,000
Buckwheat.....bushels...	4,000	1 00	4,000
Butter.....pounds...	75,000	20	15,000
Butter.....firkins...	1,800	6 00	10,800
Calves.....number...	26,000	3 00	78,000
Cattle.....number...	18,000	40 00	720,000
Cedar posts.....number...	25,000	10	2,500
Cedar rails.....number...	25,000	8	2,000
Charcoal.....bushels...	2,500,000	15	375,000
Cheese.....pounds...	60,000	10	6,000
Cherries.....quarts...	50,000	12½	6,250
Cider.....barrels...	10,000	3 00	30,000
Clay.....tons...	30,000	3 00	90,000
Corn, shelled.....bushels...	225,000	1 00	225,000
Corn meal.....bushels...	15,000	1 25	18,750
Cranberries.....bushels...	6,000	3 00	18,000
Earthenware.....		.....	65,000
Eggs.....dozen...	80,000	18	14,400
Flour.....barrels...	16,000	8 00	128,000
Fowls, common.....number...	50,000	50	25,000
Hay.....tons...	7,000	16 00	112,000
Hickory nuts.....bushels...	2,000	75	1,500
Hogs, live.....number...	4,500	5 00	22,500
Hoops or hoop poles.....M...	150	15 00	2,250
Horses.....number...	3,000	60 00	180,000
Iron castings.....tons...	6,000	60 00	360,000
Lard.....pounds...	60,000	10	6,000
Lumber, pine.....M. feet...	1,500	18 00	27,000
Lumber, cedar.....M. feet...	2,000	28 00	56,000
Oats.....bushels...	150,000	40	60,000
Onions.....bushels...	18,000	8⅓	15,000
Oysters.....bushels...	600,000	1 00	600,000
Oysters.....gallons...	10,000	1 00	10,000
Peaches.....bushels...	250,000	1 00	250,000
Peaches, dried.....bushels...	20,000	1 50	30,000
Peas.....baskets...	4,000	1 50	6,000
Plums.....bushels...	2,000	2 00	4,000
Potatoes, common.....bushels...	1,200,000	50	600,000
Potatoes, sweet.....bushels...	4,000	75	3,000
Rye.....bushels...	40,000	1 00	40,000
Sheep and lambs.....number...	100,000	2 50	250,000
Strawberries.....quarts...	80,000	12½	10,000
Tallow.....pounds...	15,000	10	1,500
Wheat.....bushels...	25,000	1 25	31,250
Whortleberries.....bushels...	50,000	3 00	150,000
Wood, pine.....cords...	10,000	4 00	40,000
Wood, hard.....cords...	3,000	5 00	15,000
Total.....			4,976,218

Abstract of agricultural products, domestic and farm animals, &c., in Indiana, as returned by the several Township Assessors, June 1, 1855: *by* B. COLLINS, *Secretary of State.*

ARTICLES.	Amount.	Valuation.
Bacon.....pounds...	24,950,763	$1,270,604
Barley.....bushels...	90,867	74,244
Cattle.....number...	798,419	7,578,200
Corn.....bushels...	34,811,902	11,756,664
Hay.....tons...	422,280	2,205,810
Hemp.....tons...	326	1,831
Homemade manufactures.....	.....	2,373,674
Hops.....pounds...	143,818	27,675
Horses, mules, and asses.....number...	304,028	13,657,874
Lard.....pounds...	5,055,199	345,376
Maple sugar.....pounds...	611,129	54,164
Market garden products.....	.....	259,273
Oats.....bushels...	8,041,919	1,997,752
Orchard products.....	.....	435,122
Pork.....barrels...	234,073	1,658,453
Other slaughtered animals.....	.....	510,293
Potatoes.....bushels...	1,170,290	628,197
Poultry.....	.....	481,128
Rye.....bushels...	226,559	171,005
Seeds, grass, &c.....bushels...	103,808	231,405
Sheep.....number...	882,797	937,370
Swine.....number...	2,668,572	5,514,098
Tobacco.....pounds...	1,195,549	55,413
Wheat.....bushels...	6,658,952	7,789,324
Wine.....gallons...	7,632	6,741
Wool.....pounds...	1,396,544	422,326
Total.....		60,444,016

Statement of the quantity and estimated value of articles of merchandise, of domestic growth and manufacture, exported from Baltimore, Maryland, in the year ending December 31, 1855: *by* PHILIP F. THOMAS, *Collector of Customs.*

ARTICLES.	Am't shipped to foreign ports.	Valuation.
Alcohol.....gallons...	22,122	$ 13,096
Apples.....barrels...	158	318
Apples, dried.....pounds...	36,533	2,678
Bacon, assorted.....boxes...	6,038	206,763
Bacon, assorted.....hhds. and casks...	21	465
Bacon hams.....hhds. and tierces...	93	4,481
Bacon, in bulk.....pounds...	1,436,399	131,532
Bark, oak.....	.....	19,857
Barley.....bushels...	68	69
Beans.....bushels...	316	466
Beef, salt.....barrels...	4,310	75,482
Beef, salt.....tierces...	9,438	330,050
Beeswax.....pounds...	28,488	8,459

STATEMENT—Continued.

ARTICLES.	Am't shipped to foreign ports.	Valuation.
Biscuit or shipbread.....barrels or kegs...	25,614	$95,813
Brooms.....number...	15,720	2,733
Butter.....pounds...	271,327	43,373
Candles.....pounds...	689,208	119,355
Cheese.....pounds...	100,292	12,576
Cider.....barrels...	25	195
Coal, bituminous.....tons...	10,774	87,198
Copper ore.....tons...	192	116,000
Cordage and cables.....pounds...	290,528	32,078
Corn, shelled.....bushels...	429,704	402,939
Corn meal.....barrels...	44,036	207,078
Cotton.....pounds...	229,880	19,503
Cotton goods, printed or colored.....yards...	2,100,656	189,059
Cotton goods, uncolored.....yards...	5,963,171	417,422
Earthenware.....	.....	1,537
Flour.....barrels...	479,821	4,346,558
Hay.....bales or tons...	348	1,132
Hops.....pounds...	3,368	951
Implements, agricultural.....	.....	13,523
Iron castings.....tons...	40	3,221
Lard.....pounds...	1,304,553	155,511
Lead, bar.....pounds...	2,000	144
Leather.....pounds...	6,768	1,786
Lumber, pine.....M. feet...	3,052	53,953
Lumber, oak.....M. feet...	612	13,528
Masts and spars.....	.....	108
Molasses.....gallons...	1,045	332
Oats.....bushels...	2,399	1,451
Oil, lard.....gallons...	4,603	3,907
Oil, linseed.....gallons...	663	653
Onions.....bushels...	1,625	2,084
Onions.....bunches...	11,879	598
Oysters.....gallons...	9,820	5,241
Peas.....bushels...	14,928	18,380
Pork.....tierces and barrels...	24,846	432,570
Potatoes, common.....bushels...	2,004	2,047
Rice.....tierces...	617	19,468
Rosin.....barrels...	21,224	38,764
Rum.....gallons...	15,085	6,317
Rye.....bushels...	28,804	38,892
Rye meal.....barrels...	5,223	35,600
Sheep and lambs.....number...	216	1,043
Shot.....pounds...	5,450	458
Snuff.....pounds...	900	108
Spirits of turpentine.....gallons...	28,116	15,348
Staves and heading.....M...	578	20,160
Sugar, cane.....pounds...	14,490	1,015
Tallow.....pounds...	79,732	9,031
Tar and pitch.....barrels...	4,089	10,521
Tobacco, leaf.....pounds...	30,767,051	2,229,661
Tobacco, strips.....pounds...	346,366	15,355
Tobacco stems.....pounds...	2,803,657	164,418
Tobacco, chewing.....pounds...	254,525	28,887
Vinegar.....gallons...	15,023	2,791
Wheat.....bushels...	167,032	349,904
Whiskey.....gallons...	24,430	14,323
Wine.....gallons...	657	306
Total.....		10,230,623

Statement of the quantity and estimated value of articles of merchandise, of domestic growth and manufacture, exported from the port of Buffalo, New York, in the year ending December 31, 1855: *by* P. HOFFMAN, *Deputy Collector of Customs.*

ARTICLES.	Am't shipped to foreign ports.	Valuation.
Apples ..... barrels...	341	$ 945
Bacon in bulk ..... pounds...	121,661	11,979
Bark, hemlock ..... cords...	54	162
Beef, salt ..... barrels...	133	2,063
Biscuit or shipbread ..... barrels or kegs...	109	761
Bricks, common ..... number...	32,000	1,680
Brooms ..... number...	5,998	1,357
Buffalo robes, dressed ..... number...	.....	1,500
Buffalo skins ..... number...	.....	1,650
Butter ..... pounds...	2,350	341
Candles ..... pounds...	42,335	4,544
Cattle ..... number...	36	1,623
Cheese ..... pounds...	92,829	8,719
Coal, bituminous ..... tons...	1,004	5,809
Cordage and cables ..... pounds...	26,666	5,039
Corn, shelled ..... barrels...	100,709	81,173
Corn meal ..... barrels...	481	1,633
Cotton goods, printed or colored ..... yards...	.....	10,129
Cotton goods, uncolored ..... yards...	.....	5,577
Earthenware	.....	2,927
Flour ..... barrels...	2,638	22,474
Hides ..... number...	191	595
Horses ..... number...	51	4,893
Iron, bar ..... pounds...	13,178	489
Iron castings ..... tons...	.....	29,201
Lard ..... pounds...	21,689	11,979
Lead, bar ..... pounds...	31,963	2,604
Leather ..... pounds...	54,730	10,095
Lumber, pine ..... feet...	124,579	2,696
Marble, quarried ..... tons...	.....	1,118
Molasses ..... gallons...	7,395	4,089
Oats ..... bushels...	55,076	30,458
Oilcloth ..... yards...	2,031	1,991
Oil, lard ..... gallons...	506	402
Oil, linseed ..... gallons...	2,158	2,152
Onions ..... bushels...	47	47
Oysters ..... gallons...	430	430
Paint, mineral ..... pounds...	.....	2,403
Peaches ..... bushels...	110	275
Pork ..... tierces and barrels...	791	12,558
Potatoes, common ..... bushels...	305	181
Rice ..... tierces...	64	1,647
Rosin ..... barrels...	73	426
Salt ..... bushels...	18,970	7,868
Snuff ..... pounds...	2,682	513
Spirits of turpentine ..... gallons...	1,395	1,186
Sugar, cane ..... pounds...	54,550	4,391
Tallow ..... pounds...	162,060	13,575
Tar and pitch ..... barrels...	308	1,515
Tobacco, chewing ..... pounds...	83,906	16,256
Vinegar ..... gallons...	3,600	531
Wheat ..... bushels...	25,500	44,622
Whiskey ..... gallons...	95,116	32,500
Total		415,771

Statement of the quantity and estimated value of articles of merchandise, of domestic growth and manufacture, exported from Cape Vincent, New York, in the year ending December 31, 1855: *by* ALFRED FOX, *Collector of Customs.*

ARTICLES.	Am't conveyed coastward by river or canal.	Am't conveyed inland.	Am't shipp'd to foreign ports.	Total Amount.	Average prices.	Valuation.
Alcohol .....gallons...	7,694	.....	2,260	9,954	$0 90	$8,959
Apples .....barrels...	.....	.....	370	370	2 00	740
Apples, dried.....pounds...	.....	675	41,000	41,675	4	1,667
Ashes, pot.....pounds...	.....	183,523	.....	183,523	4	7,341
Ashes, pearl.....pounds...	87,455	9,689	.....	97,144	6	5,829
Bacon hams..hhds.&tierces...	.....	669	.....	669	12 50	8,363
Bagging .....pieces...	.....	.....	580	580	.....	2,886
Barley .....bushels...	.....	31,325	.....	31,325	1 00	31,325
Beans .....bushels...	.....	1,200	.....	1,200	1 25	1,500
Beef, salt .....barrels...	.....	1,684	.....	1,684	12 00	20,208
Beef, salt.....tierces...	.....	1,865	.....	1,865	18 00	33,570
Beeswax.....pounds...	.....	3,391	.....	3,391	30	1,017
Bonedust.....pounds...	.....	9,511	.....	9,511	.....	.....
Bricks, fire.....number...	88,000	.....	.....	88,000	10 00	880
Brooms .....number...	85,470	.....	63,796	149,266	15	22,390
Buffalo skins, dress'd " ...	.....	.....	240	240	4 00	960
Butter .....pounds...	1,964	20,542	.....	22,506	20	4,501
Butter .....firkins...	.....	.....	570	570	.....	.....
Candles.....pounds...	7,800	8,090	20,149	36,039	30	10,812
Cattle.....number...	.....	647	.....	647	40 00	25,880
Cheese .....pounds...	.....	453,193	16,575	469,768	10	46,977
Clover seed, white..pounds...	.....	38,475	.....	38,475	5 00	192,375
Clover seed, red....pounds...	.....	.....	83,020	83,020	6 00	498,120
Coco-nuts.....number...	.....	.....	2,500	2,500	10	250
Copper, pig.....pounds...	.....	69,450	.....	69,450	40	27,780
Copper pipe .....pounds...	.....	.....	11,096	11,096	60	6,658
Copper, sheet .....pounds...	.....	.....	19,470	19,470	50	9,735
Cordage & cables ...pounds...	216,800	.....	238,670	455,470	15	68,321
Corn, shelled .....bushels...	.....	284,647	1,500	286,147	1 00	286,147
Corn meal.....barrels...	.....	1,441	2,390	3,831	4 00	15,324
Cotton goods, p. or c...yds...	.....	.....	666,630	666,630	10	66,663
Cotton goods, uncol'd..yds...	1,802,400	.....	519,685	2,322,085	7	162,546
Cotton yarn.....pounds...	9,878	.....	24,692	34,570	15	5,186
Cranberries .....bushels...	.....	511	.....	511	.....	.....
Eggs.....number...	.....	240,000	.....	240,000	1¼	3,000
Feathers.....pounds...	.....	1,206	.....	1,206	38	458
Flax .....pounds...	.....	10,232	.....	10,232	10	1,023
Flour .....barrels...	.....	12,423	.....	12,423	10 00	124,230
Fowls, common....number...	.....	2,085	.....	2,085	25	521
Gin.....gallons...	36,876	.....	.....	36,876	1 25	46,095
Ginseng.....pounds...	.....	125	.....	125	.....	.....
Hay .....tons...	.....	.....	100	100	9 00	900
Hickory nuts .....bushels...	.....	187	.....	187	1 25	234
Hides .....number...	.....	8,895	.....	8,895	3 00	26,685
Hogs, live.....number...	.....	1,526	.....	1,526	5 00	7,630
Hops .....pounds...	.....	30,878	.....	30,878	20	6,176
Horn shavings.....pounds...	.....	5,500	.....	5,500	9	50
Horses .....number...	.....	127	36	163	117 00	19,071
Implements, agricultural.....	.....	.....	.....	.....	.....	46,436
Indigo .....pounds...	.....	.....	.....	.....	1 50	2,856
Iron, pig.....pounds...	5,000,000	.....	1,718,100	6,718,100	1½	100,772
Iron, bar.....pounds...	589,720	24,826	.....	614,546	5	30,727

STATEMENT—Continued.

ARTICLES.	Am't conveyed coastward by river or canal.	Am't conveyed inland.	Am't shipp'd to foreign ports.	Total Amount.	Average Prices.	Valuation.
Iron castings.....tons...	428	.....	645	1,073	$100 00	$107,300
Iron pipe.....pounds...	228,120	.....	27,389	255,509	8	20,441
Iron, sheet .....pounds...	18,790	.....	.....	18,790	10	1,879
Lard .....pounds...	.....	64,920	20,940	85,860	13	11,162
Lead pipe.....pounds...	36,876	.....	14,790	51,666	13	6,717
Leather.....rolls...	1,192	151	202	1,545	lb. 24	50,000
Lime.....barrels...	893	257	.....	1,150	50	575
Lumber, pine.....M. feet...	.....	11,000	.....	11,000	12 00	132,000
Lumber, hemlock...M. feet...	300	.....	.....	300	7 00	2,100
Lumber, blk.walnut.M. feet...	.....	42	.....	42	.....	1,680
Marble, quarried.....slabs...	85	.....	.....	85	40 00	3,400
Molasses.....gallons...	165,664	.....	43,393	209,507	25	52,264
Oats.....bushels...	.....	8,000	.....	8,000	40	3,200
Oil, lard.....gallons...	16,720	392	.....	17,112	88	15,059
Oil, linseed.....gallons...	155,520	756	9,420	165,696	1 00	165,696
Onions .....bushels...	.....	.....	670	670	1 00	670
Oysters.....gallons...	.....	.....	5,000	5,000	1 50	7,500
Paint, mineral.....pounds...	.....	19,827	.....	19,827	5	991
Peaches .....bushels...	.....	.....	317	317	.....	792
Peanuts. .....bushels...	167	.....	.....	.....	5 00	835
Pelts, sheep or lambs'..nu'r...	.....	24,770	.....	24,770	60	14,862
Pickles .....pounds...	2,600	.....	.....	2,600	10	260
Pork.....tierces & bbls...	.....	3,019	457	3,476	18 00	62,568
Pork, in bulk.....pounds...	.....	28,060	.....	28,060	10 00	2,806
Potatoes, sweet.....bushels...	.....	.....	50	50	1 50	75
Rags, paper .....pounds...	.....	35,610	.....	35,610	3	1,068
Rice .....tierces...	884	.....	370	1,254	41 78	52,392
Rosin .....barrels...	253	.....	321	574	3 00	1,722
Rum.....gallons...	14,128	.....	.....	14,128	60	8,477
Rye.....bushels...	.....	33,408	.....	33,408	1 00	33,408
Rye meal.....barrels...	.....	437	.....	437	5 00	2,185
Sheep and lambs...number...	.....	1,989	.....	1,989	3 00	5,967
Shot.....pounds...	120,170	.....	.....	120,170	10	12,017
Snuff.....pounds...	7,328	.....	.....	7,328	30	2,198
Spts. of turpentine.gallons...	88,704	.....	4,950	93,654	75	70,241
Staves and heading.....M...	.....	67,576	.....	67,576	40 00	27,030
Tallow.....pounds...	.....	4,900	7,475	12,375	10	1,238
Tar and pitch.....barrels...	480	.....	199	679	5 00	3,395
Timothy seed.....bushels...	.....	9,876	.....	9,876	2 50	24,690
Tobacco leaf .....pounds...	.....	5,853	.....	5,853	10	585
Tobacco stems..... pounds...	230,400	.....	.....	230,400	15	34,560
Tobacco, chewing..pounds...	283,200	.....	274,367	557,567	20	111,513
Turkeys.....number...	.....	684	.....	684	75	513
Twine .....pounds...	4,768	.....	.....	4,768	13	620
Vinegar .....gallons...	2,152	1,987	990	5,129	25	1,282
Wheat.....bushels...	.....	79,918	.....	79,918	1 75	139,857
Whiskey .....gallons...	24,678	.....	.....	24,678	40	9,871
Wine.....gallons...	2,567	642	.....	3,209	1 00	3,209
Wool.....pounds...	.....	78,186	.....	78,186	30	23,456
Woollen yarn .....pounds...	8,879	.....	.....	8,879	60	5,327
Total.....						3,233,653

Statement of the quantity and estimated value of articles of merchandise, of domestic growth and manufacture, exported from Elizabeth City, North Carolina, in the year ending December 31, 1855: *by* L. D. STARKE, *Collector of Customs.*

ARTICLES.	Am't shipped to foreign ports.	Average Prices.	Valuation.
Beef, salt.....barrels...	12	$12 50	$150
Peas.....bushels...	192	90¾	174
Staves and heading.....M...	393	23 75	9,334
Tar and pitch.....barrels...	40	2 12½	85
Total.....			9,743

Statement of the quantity and estimated value of articles of merchandise, of domestic growth and manufacture, exported from Darien, Georgia, in the year ending December 31, 1855: *by* WOODFORF MABRY, *Collector of Customs.*

ARTICLES.	Am't conv'd coastwise by river.	Amount shipped to for'n ports.	Total amount.	Av'ge prices.	Valuation.
Cotton.....pounds...	500,000	.....	500,000	$0 15	$75,000
Hides.....pounds...	50,000	.....	50,000	10	5,000
Lumber.....M. feet...	25,544	2,456	28,000	10 00	280,000
Moss.....pounds...	15,000	.....	15,000	3	450
Oars.....feet...	20,000	.....	20,000	10	2,000
Rosin.....barrels...	35,558	442	36,000	3 00	108,000
Rice.....tierces...	45,000	.....	45,000	37 00	1,665,000
Shingles.....M...	500,000	.....	500,000	5 00	2,500,000
Total.....					4,635,450

Statement of the quantity and estimated value of articles of merchandise, of domestic growth and manufacture, exported from Detroit, Michigan, in the year ending December 31, 1855: *by* JOHN H. HARMON, *Collector of Customs.*

ARTICLES.	Am't conveyed coastward by river or lake.	Am't shipped to foreign ports.	Total amount.	Average prices.	Valuation.
Alcohol.....gallons...	226,915	5,175	232,090	$0 30	$69,627 00
Apples.....barrels...	417	.....	417	1 50	625 50
Ashes, pot.....pounds...	34,500	.....	34,500	6 00	2,070 00
Beef, salt.....barrels...	25,685	1,430	27,115	10 00	271,150 00

STATEMENT—Continued.

ARTICLES.	Am't conveyed coastward or by river or lake.	Am't shipped to foreign ports.	Total amount.	Average Prices.	Valuation.
Bricks, common.....number...	.....	75,000	75,000	$4 00	$300,000 00
Buffalo skins, dressed....number...	225	11	236	10 00	2,360 00
Butter.....pounds...	525	.....	525	10	52 50
Calves .....number...	632	.....	632	4 00	2,528 00
Candles.....pounds...	7,212	1,320	8,532	10	853 20
Cattle.....number...	2,020	18,130	20,150	20 00	403,000 00
Cheese.....pounds...	8,324	2,331	10,655	10	1,065 50
Coal, bituminous.....tons...	3,790	6,230	10,020	5 00	50,100 00
Copper ore.....tons...	4,150	.....	4,150	300 00	1,245,000 00
Corn, shelled.....bushels...	212,429	137,542	349,971	50	174,985 50
Cotton piece goods.....pieces...	.....	5,585	5,585	15 00	83,775 00
Feathers.....pounds...	2,550	.....	2,550	25	637 50
Flannel, woollen.....yards...	.....	2,260	2,260	37	836 20
Flour .....barrels...	193,769	10,457	204,226	8 00	1,633,808 00
Fowls, common.....number...	5,250	.....	5,250	10	525 00
Hay.....bales or tons...	510	.....	510	10 00	5,100 00
Hides .....number...	3,225	.....	3,225	3 00	9,675 00
Hogs, live.....number...	1,210	3,520	4,730	8 00	37,840 00
Hops.....pounds...	5,232	.....	5,232	12½	654 00
Implements, agricultural.....	.....	.....	.....	.....	5,000 00
Lard.....pounds...	7,545	3,450	10,995	6	659 70
Leather.....rolls...	1,094	131	1,225	15 00	18,375 00
Lumber, pine.....M. feet...	23,155	10,552	33,707	12 00	404,484 00
Lumber, oak.....M. feet...	22,560	16,326	38,886	12 00	466,632 00
Lumber, black walnut....M. feet...	5,325	.....	5,325	14 00	74,550 00
Molasses.....gallons...	320	225	545	50	272 50
Muskrat skins.....number...	1,200	.....	1,200	6	72 00
Oats .....bushels...	35,195	.....	35,195	30	10,558 50
Oil, lard .....gallons...	2,270	2,630	4,900	1 00	4,900 00
Peas .....bushels...	444	.....	444	50	222 00
Pork.....tierces and barrels...	8,194	22,361	30,555	16 00	488,880 00
Potatoes, common.....bushels...	32,275	.....	32,275	50	16,137 50
Raccoon skins.....number...	340	152	492	50	246 00
Rags, paper.....pounds...	22,355	.....	22,355	2	447 10
Rosin.....barrels...	251	535	786	4 00	3,144 00
Salt.....bushels...	151,040	5,230	156,270	50	78,135 00
Satinet.....yards...	231	520	751	50	375 50
Sheep and lambs.....number...	6,554	.....	6,554	2 00	13,108 00
Shot .....pounds...	250	525	775	6	46 50
Snuff.....pounds...	.....	.....	335	50	167 50
Spirits of turpentine.....gallons...	221	.....	221	50	110 50
Staves and heading.....M...	23,555	.....	23,555	10 00	235,550 00
Tar and pitch.....barrels...	1,000	250	1,250	6 00	7,500 00
Tobacco, leaf.....pounds...	500	.....	500	10	50 00
Tobacco, chewing.....pounds...	521	1,000	1,521	50	760 50
Turkeys.....number...	564	.....	564	1 00	564 00
Vinegar.....gallons...	.....	110	110	12	13 75
Wheat.....bushels...	308,219	512,450	820,669	1 50	1,231,003 50
Whiskey .....gallons...	3,609,090	136,310	3,745,400	50	1,123,620 00
Wool.....pounds...	1,037,200	.....	1,037,200	25	259,300 00
Total.....					8,741,152 95

Statement of the quantity and estimated value of articles of merchandise, of domestic growth and manufacture, exported from Chicago, Illinois, in the year ending December 31, 1855: *by* PHILIP CONLEY, *Collector of Customs.*

ARTICLES.	Am't conveyed coastward by river or lake.	Am't conveyed coastward by railroad or by land.	Am't conveyed inland.	Total Amount.	Av'rage Prices.	Valuation.
Alcohol.....gallons	146,934	87,394	.....	234,328	$0 40	$93,731 20
Apples .....barrels	913	.....	5,443	6,356	2 50	15,890 00
Apples, dried..pounds	289,672	7,384	35,257	332,313	7	23,261 91
Ashes, pot.....pounds	.....	38,943	.....	38,943	5	1,947 15
Ashes, pot.....tons	170	.....	.....	170	100 00	17,000 00
Bark, hemlock...cords	728	114	320	1,162	8 00	9,296 00
Barley .....bushels	51,315	40,327	1,960	93,602	1 00	93,602 00
Beans .....bushels	2,346	58,319	.....	60,665	2 00	121,330 00
Beef, salt.....barrels	47,677	8,086	.....	55,763	13 00	724,919 00
Beef, salt .....tierces	3,450	2,936	.....	6,386	20 00	127,720 00
Beeswax.....pounds	1,360	2,480	.....	3,840	40	1,536 00
Bricks.....number	342,000	458,398	.....	800,398	1	8,003 98
Brooms.....number	392,418	142,384	.....	534,802	15	80,220 30
Butter.....pounds	386,381	681,793	.....	1,068,174	16	170,907 84
Butter.....firkins	13,480	17,960	.....	31,440	10 50	330,120 00
Cattle.....number	16,483	3,921	.....	20,404	40 00	816,160 00
Cedar posts ...number	713,460	118,627	.....	832,087	12	99,850 44
Cheese .....pounds	760,841	421,063	.....	1,181,904	10	118,190 40
Coal, anthracite..tons	857	12,860	.....	13,717	9 00	123,453 00
Coal, bituminous.tons	1,460	3,871	.....	5,331	7 50	39,982 50
Corn, shelled..bushels	7,439,986	178,324	.....	7,618,310	60	4,570,986 00
Corn meal.....barrels	8,396	.....	.....	8,396	5 00	41,980 00
Cranberries....bushels	1,396	875	.....	2,271	4 00	9,084 00
Eggs.....number	875,386	27,483	.....	902,869	1	9,028 69
Feathers.....pounds	44,385	12,671	.....	57,056	56	31,951 36
Flaxseed.....bushels	12,386	3,482	.....	15,868	2 00	31,736 00
Flour .....barrels	116,384	187,113	.....	303,497	8 00	2,427,976 00
Grass seed.....pounds	3,118,250	15,630	1,191,687	4,325,567	7	302,789 69
Hay.....bales or tons	1,473	.....	.....	1,473	9 00	13,257 00
Hemp.....pounds	14,360	.....	.....	14,360	4	574 40
Hides .....number	316,426	10,674	.....	327,100	5 00	1,635,500 00
Hogs, live .....number	.....	110,384	.....	110,384	12 00	1,324,608 00
Horses.....number	1,720	457	.....	2,177	126 00	274,302 00
Iron, pig.....pounds	129,700	463,837	.....	593,537	2½	14,838 42
Iron, railroad.....tons	.....	3,927	.....	3,927	60 00	235,620 00
Lard.....pounds	1,874,972	316,984	.....	2,191,956	10	219,195 60
Laths.....pieces	21,383,481	24,148,125	.....	45,531,606	¼	113,829 01½
Lead, pig .....pounds	4,927,843	.....	.....	4,927,843	6	295,670 58
Lead pipe .....pounds	1,973,123	.....	.....	1,973,123	7	138,118 61
Lime.....barrels	.....	6,552	.....	6,552	2 00	13,104 00
Lumber, pine .....feet	134,627,893	101,486,921	.....	236,114,814	2	4,722,296 28
Molasses.....gallons	171,346	97,864	.....	269,210	45	121,144 50
Oats.....bushels	2,341,960	.....	.....	2,341,960	35	819,686 00
Oil, lard.....gallons	27,863	41,921	.....	69,784	1 00	69,784 00
Peaches, dried.bushels	13,970	.....	.....	13,970	2 00	27,940 00
Peas.....bushels	19,370	.....	.....	19,370	2 00	38,740 00
Pork.....tierces & bbls.	49,162	22,484	.....	71,646	16 00	1,146,336 00
Pork in bulk..pounds	763,421	13,127,384	.....	13,890,805	5	694,540 25
Potatoes, com'n.bush.	18,470	50,328	.....	68,798	1 00	68,798 00
Rye.....bushels	18,470	1,763	.....	20,233	90	18,209 70
Salt.....barrels	22,421	55,960	.....	78,381	2 00	156,762 00
Staves & head'g.numb.	1,446,831	44,352	.....	1,491,183	½	7,455 91½

STATEMENT—Continued.

ARTICLES.	Am't conveyed coastward by river or lake.	Am't conveyed coastward by railroad or by land.	Am't conveyed inland.	Total Amount.	Av'rage Prices.	Valuation.
Sugar, cane...pounds	120,960	147,382	.....	268,342	$0 05½	$14,758 81
Tallow.....pounds	900,321	79,466	.....	979,787	13	127,372 31
Tobacco, chew'g "	16,535	21,684	.....	38,219	50	19,109 50
Wheat.....bushels	5,719,168	721,863	....	6,441,031	1 60	10,305,649 60
Woollen yarn...skeins	898,940	1,687,664	.....	2,586,604	35	905,311 40
Total.....						33,985,165 35

FOREIGN EXPORTS,

FROM 1821 TO 1855.

Summary statement of the estimated quantities and valuation of the principal exports of the growth, produce, and manufacture of the United States, during the fiscal year, ending September 30, 1821.
[Condensed from the Annual Report on Commerce and Navigation.]

ARTICLES.	Number and quantities.	Valuation.
Animals and their products—		
Hogs ..... number...	7,885	
Pork ..... barrels...	66,647	$ 1,354,116
Bacon and hams ..... pounds...	1,607,506	
Lard ..... pounds...	3,996,561	
Horned cattle ..... number...	5,018	
Beef ..... barrels...	66,887	698,323
Tallow ..... pounds...	81,691	
Hides ..... number...	13,558	
Butter ..... pounds...	1,069,024	190,287
Cheese ..... pounds...	766,431	
Tallow candles ..... pounds...	1,453,628	661,409
Soap ..... pounds...	3,915,272	
Horses ..... number...	853	59,830
Mules ..... number...	94	
Leather ..... pounds...	243,555	
Boots ..... pairs...	3,392	263,258
Shoes ..... pairs...	187,889	
Sheep ..... number...	11,117	22,175
Skins and furs	.....	766,205
Wax ..... pounds...	241,909	85,654
Apples ..... bushels...	68,643	39,966
Bread stuffs—		
Indian corn ..... bushels...	607,277	261,099
Indian meal ..... barrels...	131,669	345,180
Wheat ..... bushels...	25,821	20,925
Flour ..... barrels...	1,056,119	4,298,043
Rye meal ..... barrels...	23,523	55,226
Rye, oats, &c	.....	47,137
Rice ..... tierces...	88,221	1,494,307
Biscuit, or ship-bread ..... barrels...	47,509	157,389
Biscuit, or ship-bread ..... kegs...	31,370	
Potatoes ..... bushels...	90,889	30,500
Cables and cordage ..... cwt....	2,384	26,662
Cotton—		
Sea Island ..... pounds...	11,344,066	20,157,484
Other kinds ..... pounds...	113,549,339	
Flaxseed ..... bushels...	264,310	420,202
Ginseng ..... pounds...	352,992	171,786
Hops ..... pounds...	319,501	18,498
Indigo ..... pounds...	1,004	714
Linseed oil ..... gallons...	16,370	20,532
Spirits of turpentine ..... gallons...	19,016	
Spirits from grain ..... gallons...	167,422	
Beer, ale, porter, and cider, (in casks,) ..... gallons...	87,592	120,561
Beer, ale, porter, and cider, (in bottles,) ..... dozens...	14,456	

STATEMENT—Concluded.

ARTICLES.	Number and quantities.	Valuation.
Spirits from molasses ..... gallons...	840,761	$ 280,648
Sugar, brown ..... pounds...	24,592	1,975
Sugar, refined ..... pounds...	156,527	24,051
Tobacco ..... hogsheads...	66,858	5,648,962
Tobacco, manufactured ..... pounds...	1,332,949	149,083
Snuff ..... pounds...	44,552	
Wood and its products—		
Staves and heading ..... thousand...	25,506	
Shingles ..... thousand...	53,583	
Boards, plank, &c ..... M feet...	76,244	1,367,660
Hewn timber ..... tons...	15,220	
Other lumber	.....	90,521
Masts and spars	.....	54,627
Oak-bark and other dye	.....	139,534
Ashes, pot and pearl ..... tons...	8,353	889,348
Tar and pitch ..... barrels...	71,196	314,660
Rosin and turpentine ..... barrels...	79,213	

Summary statement of the estimated quantities and valuation of the principal exports of the growth, produce, and manufacture of the United States, during the fiscal year, ending September 30, 1822. Condensed from the Annual Report on Commerce and Navigation.]

ARTICLES.	Number and quantities.	Valuation.
Animals and their products—		
Hogs ..... number...	9,798	
Pork ..... barrels...	68,352	
Bacon and hams ..... pounds...	1,142,945	$ 1,357,899
Lard ..... pounds...	4,137,814	
Horned cattle ..... number...	3,557	
Beef ..... barrels...	97,610	
Tallow ..... pounds...	63,856	844,534
Hides ..... number...	15,079	
Butter ..... pounds...	1,149,783	
Cheese ..... pounds...	722,548	221,041
Tallow candles ..... pounds...	1,564,460	
Soap ..... pounds...	5,727,738	788,946
Horses ..... number...	1,182	
Mules ..... number...	121	93,753
Leather ..... pounds...	233,607	
Boots ..... pairs...	6,561	
Shoes ..... pairs...	244,999	326,030
Sheep ..... number...	6,368	12,276
Skins and furs	.....	501,302
Wax ..... pounds...	238,795	93,129
Apples ..... bushels...	63,689	48,499
Bread stuffs—		
Indian corn ..... bushels...	509,098	378,427
Indian meal ..... barrels...	148,228	522,229
Wheat ..... bushels...	4,418	3,080
Flour ..... barrels...	827,865	5,103,280
Rye meal ..... barrels...	19,971	75,736
Rye, oats, &c	.....	63,832
Rice ..... tierces...	87,089	1,553,482
Biscuit, or ship-bread ..... barrels...	44,581	180,926
Biscuit, or ship-bread ..... kegs...	33,382	
Potatoes ..... bushels...	129,814	45,758

STATEMENT—Concluded.

ARTICLES.	Number and quantities.	Valuation.
Cables and cordage.....cwt...	2,914	$ 33,807
Cotton—		
Sea Island.....pounds...	11,250,635	24,035,058
Other kinds.....pounds...	133,424,460	
Flaxseed.....bushels...	289,111	392,772
Ginseng.....pounds...	753,717	313,943
Hops.....pounds...	283,200	23,025
Indigo.....pounds...	3,283	2,399
Linseed oil.....gallons...	18,527	27,985
Spirits of turpentine.....gallons...	25,205	
Spirits from grain.....gallons...	196,277	
Beer, ale, porter, and cider, (in casks,).....gallons...	37,654	124,140
Beer, ale, porter, and cider, (in bottles,).....dozens...	19,340	
Spirits from molasses.....gallons...	166,925	60,045
Sugar, brown.....pounds...	8,593	805
Sugar, refined.....pounds...	177,065	26,320
Tobacco.....hogsheads...	83,169	6,222,838
Tobacco, manufactured.....pounds...	1,414,424	157,182
Snuff.....pounds...	44,602	
Wood, and its products—		
Staves and heading.....thousand...	15,784	1,184,399
Shingles.....thousand...	52,183	
Boards, plank, and scantling.....M feet...	68,490	
Hewn timber.....tons...	10,487	
Other lumber.....	.....	92,733
Masts and spars.....	.....	30,538
Oak-bark and other dye.....	.....	145,705
Ashes, pot and pearl.....tons...	9,606	1,099,053
Tar and pitch.....barrels...	100,213	447,869
Rosin and turpentine.....barrels...	96,166	

Summary statement of the estimated quantities and valuation of the principal exports of the growth, produce, and manufacture of the United States, during the fiscal year, ending September 30, 1823.
[Condensed from the Annual Report on Commerce and Navigation.]

ARTICLES.	Number and quantities.	Valuation.
Animals and their products—		
Hogs.....number...	11,436	$ 1,291,322
Pork.....barrels...	55,529	
Bacon and hams.....pounds...	1,637,157	
Lard.....pounds...	6,067,071	
Horned cattle.....number...	2,865	739,461
Beef.....barrels...	61,418	
Tallow.....pounds...	735,333	
Hides.....number...	42,499	
Butter.....pounds...	1,171,701	192,778
Cheese.....pounds...	591,689	
Tallow candles.....pounds...	1,682,917	664,807
Soap.....pounds...	5,195,016	
Horses.....number...	1,630	123,373
Mules.....number...	438	
Leather.....pounds...	322,464	492,504
Boots.....pairs...	9,965	
Shoes.....pairs...	439,004	

STATEMENT—Concluded.

ARTICLES.	Number and quantities.	Valuation.
Sheep.....number...	6,880	$ 15,029
Skins and furs.....	.....	672,917
Wax.....pounds...	325,116	112,574
Apples.....bushels...	53,606	30,429
Bread stuffs—		
Indian corn.....bushels...	749,034	453,622
Indian meal.....barrels...	141,501	476,867
Wheat.....bushels...	4,272	5,663
Flour.....barrels...	756,702	4,962,373
Rye meal.....barrels...	25,665	91,957
Rye, oats, &c.....	.....	89,354
Rice.....tierces...	101,365	1,820,985
Biscuit and ship-bread.....barrels...	43,700	183,401
Biscuit and ship-bread.....kegs...	30,994	
Potatoes.....bushels...	104,187	37,241
Cables and cordage.....cwt...	2,287	22,659
Cotton—		
Sea Island.....pounds...	12,136,688	20,445,520
Other kinds.....pounds...	161,586,582	
Flaxseed.....bushels...	232,761	262,314
Ginseng.....pounds...	385,877	150,976
Hops.....pounds...	249,927	27,124
Indigo.....pounds...	2,990	2,314
Linseed oil.....gallons...	13,594	17,192
Spirits of turpentine.....gallons...	16,796	
Spirits from grain.....gallons...	111,314	89,615
Beer, ale, porter, and cider, (in casks,).....gallons...	26,568	
Beer, ale, porter, and cider, (in bottles,).....dozens...	20,793	
Spirits from molasses.....gallons...	95,119	37,807
Sugar, brown.....pounds...	3,846	353
Sugar, refined.....pounds...	55,187	6,654
Tobacco.....hogsheads...	99,009	6,282,672
Tobacco, manufactured.....pounds...	1,987,507	154,955
Snuff.....pounds...	36,684	
Wood, and its products—		
Staves and heading.....thousand...	18,667	1,186,118
Shingles.....thousand...	40,383	
Boards, plank, and scantling.....M feet...	64,620	
Hewn timber.....tons...	3,756	
Other lumber.....	.....	128,525
Masts and spars.....	.....	20,957
Oak-bark and other dye.....	.....	111,333
Ashes, pot and pearl.....tons...	13,214	1,770,523
Tar and pitch.....barrels...	45,032	457,562
Rosin and turpentine.....barrels...	137,530	

Summary statement of the estimated quantities and valuation of the principal exports of the growth, produce, and manufacture of the United States, during the fiscal year, ending September 30, 1824.
[Condensed from the Annual Report on Commerce and Navigation.]

ARTICLES.	Number and quantities.	Valuation.
Animals and their products—		
Hogs.....number...	8,838	$ 1,489,051
Pork.....barrels...	67,229	
Bacon and hams.....pounds...	1,409,199	
Lard.....pounds...	5,053,182	

STATEMENT—Concluded.

ARTICLES.	Number and quantities.	Valuation.
Horned cattle.....number...	2,759	
Beef.....barrels...	66,074	$707,299
Tallow.....pounds...	96,261	
Hides.....number...	46,166	
Butter.....pounds...	1,386,232	204,205
Cheese.....pounds...	933,158	
Tallow candles.....pounds...	2,186,177	816,095
Soap.....pounds...	6,988,081	
Horses.....number...	2,711	213,396
Mules.....number...	840	
Leather.....pounds...	557,614	
Boots.....pairs...	10,447	710,924
Shoes.....pairs...	682,865	
Sheep.....number...	7,421	14,938
Skins and furs.....	.....	661,455
Wax.....pounds...	308,738	107,451
Apples.....barrels...	27,055	46,813
Bread stuffs—		
Indian corn.....bushels...	779,297	351,665
Indian meal.....barrels...	152,723	384,675
Wheat.....bushels...	20,373	20,740
Flour.....barrels...	996,792	5,759,176
Rye meal.....barrels...	31,879	85,651
Rye, oats, &c.....	.....	95,401
Rice.....tierces...	113,229	1,882,982
Biscuit, or ship bread.....barrels...	50,888	197,339
Biscuit, or ship bread.....kegs...	33,282	
Potatoes.....bushels...	131,194	44,042
Cables and cordage.....cwt...	4,769	47,262
Cotton—		
Sea Island.....pounds...	9,525,722	21,947,401
Other kinds.....pounds...	132,843,941	
Flaxseed.....bushels...	377,226	504,327
Ginseng.....pounds...	600,046	229,080
Hops.....pounds...	389,788	81,810
Indigo.....pounds...	818	836
Linseed oil.....gallons...	13,924	23,607
Spirits of turpentine.....gallons...	30,933	
Spirits from grain.....gallons...	340,868	
Beer, ale, porter, and cider, (in casks,).....gallons...	28,539	154,144
Beer, ale, porter, and cider, (in bottles,).....dozens...	20,923	
Spirits from molasses.....gallons...	158,556	51,172
Sugar, brown.....pounds...	5,960	434
Sugar, refined.....pounds...	57,908	7,195
Tobacco.....hogsheads...	77,883	4,855,566
Tobacco, manufactured.....pounds...	2,477,990	203,789
Snuff.....pounds...	45,174	
Wood and its products—		
Staves and heading.....thousand...	28,682	
Shingles.....thousand...	38,129	
Boards, plank, and scantling.....M feet...	77,292	1, 91,986
Hewn timber.....tons...	7,166	
Other lumber.....	.....	206,949
Masts and spars.....	.....	35,651
Oak bark and other dye.....	.....	95,674
Ashes, pot and pearl.....tons...	12,938	1,613,796
Tar and pitch.....barrels...	46,537	555,055
Rosin and turpentine.....barrels...	176,136	

Summary statement of the estimated quantities and valuation of the principal exports of the growth, produce, and manufacture of the United States, during the fiscal year, ending September 30, 1825.
[Condensed from the Annual Report on Commerce and Navigation.]

ARTICLES.	Number and quantities.	Valuation.
Animals and their products—		
Hogs.....number...	4,525	
Pork.....barrels...	85,709	$1,832,679
Bacon and hams.....pounds...	1,896,359	
Lard.....pounds...	5,483,048	
Horned cattle.....number...	3,095	
Beef.....barrels...	88,025	
Tallow.....pounds...	533,451	930,465
Hides.....number...	56,043	
Butter.....pounds...	1,442,197	
Cheese.....pounds...	1,230,104	247,787
Tallow candles.....pounds...	2,336,408	
Soap.....pounds...	6,555,075	790,975
Horses.....number...	3,861	
Mules.....number...	576	283,835
Leather.....pounds...	590,441	
Boots.....pairs...	12,488	
Shoes.....pairs...	513,000	621,702
Sheep.....number...	9,681	20,027
Skins and furs.....	.....	524,692
Wax.....pounds...	219,884	85,592
Apples.....barrels...	32,354	53,662
Bread stuffs—		
Indian corn.....bushels...	869,644	429,906
Indian meal.....barrels...	187,285	448,167
Wheat.....bushels...	17,990	18,570
Flour.....barrels...	813,906	4,212,127
Rye meal.....barrels...	29,545	73,245
Rye, oats, &c.....	.....	92,226
Rice.....tierces...	97,015	1,925,245
Biscuit, or ship bread.....barrels...	68,627	
Biscuit, or ship bread.....kegs...	37,873	235,982
Potatoes.....bushels...	106,954	37,588
Cables and cordage.....cwt...	2,472	28,114
Cotton—		
Sea Island.....pounds...	9,665,278	
Other kinds.....pounds...	166,784,629	36,846,649
Flaxseed.....bushels...	234,042	234,845
Ginseng.....pounds...	475,974	144,599
Hops.....pounds...	117,623	13,865
Indigo.....pounds...	9,955	7,034
Linseed oil.....gallons...	9,022	
Spirits of turpentine.....gallons...	39,469	25,569
Spirits from grain.....gallons...	332,084	
Beer, ale, porter, and cider, (in casks,).....gallons...	36,565	154,223
Beer, ale, porter, and cider, (in bottles,).....dozens...	20,553	
Spirits from molasses.....gallons...	127,950	51,505
Sugar, brown.....pounds...	27,782	2,632
Sugar, refined.....pounds...	50,017	6,963
Tobacco.....hogsheads...	75,984	6,115,623
Tobacco, manufactured.....pounds...	1,871,368	
Snuff.....pounds...	53,920	172,353
Wood and its products—		
Staves and heading.....thousand...	23,507	
Shingles.....thousand...	40,959	
Boards, plank, and scantling.....M feet...	78,061	1,481,266
Hewn timber.....tons...	18,176	
Other lumber.....	.....	168,952
Masts and spars.....	.....	67,353

STATEMENT—Concluded.

ARTICLES.	Number and quantities.	Valuation.
Oak-bark and other dye		$93,809
Ashes, pot and pearl, tons	18,479	1,994,381
Tar and pitch, barrels	47,340	463,897
Rosin and turpentine, barrels	158,863	

Summary statement of the estimated quantities and valuation of the principal exports of the growth, produce, and manufacture of the United States, during the fiscal year, ending September 30, 1826.
[Condensed from the Annual Report on Commerce and Navigation.]

ARTICLES.	Number and quantities.	Valuation.
Animals and their products—		
Hogs, number	6,939	
Pork, barrels	88,994	$1,892,429
Bacon and hams, pounds	1,836,133	
Lard, pounds	7,231,643	
Horned cattle, number	3,427	
Beef, barrels	72,886	
Tallow, pounds	423,610	733,430
Hides, number	29,841	
Butter, pounds	1,176,579	
Cheese, pounds	735,399	207,765
Tallow candles, pounds	2,062,225	
Soap, pounds	6,089,408	722,417
Horses, number	2,931	
Mules, number	922	47,543
Leather and morocco skins		43,834
Leather, pounds	607,334	
Boots, pairs	13,365	586,57[illegible]
Shoes, pairs	448,807	
Sheep, number	8,695	17,69[illegible]
Skins and furs		582,473
Wax, pounds	473,832	206,001
Apples, barrels	15,695	27,370
Bread stuffs—		
Indian corn, bushels	505,381	384,955
Indian meal, barrels	158,652	622,366
Wheat, bushels	45,166	38,676
Flour, barrels	857,820	4,121,466
Rye meal, barrels	14,472	49,297
Rye, oats, &c.		72,371
Rice, tierces	111,063	1,917,445
Biscuit, or ship-bread, barrels	72,253	
Biscuit, or ship-bread, kegs	49,705	251,728
Potatoes, bushels	87,734	41,583
Cables and cordage, cwt.	2,743	31,482
Cotton—		
Sea Island, pounds	5,972,852	
Other kinds, pounds	198,562,563	25,025,214
Cotton, piece goods—		
Printed and colored		68,884
White		821,629
Nankeen		8,903
Twist, yarn, and thread		11,135
All other manufactures		227,574

STATEMENT—Concluded.

ARTICLES.	Number and quantities.	Valuation.
Flaxseed.....bushels...	117,672	$144,908
Flax and hemp—		
Cloth and thread.....	.....	2,937
Bags, and all other manufactures.....	.....	5,444
Ginseng.....pounds...	437,420	137,014
Hops.....pounds...	388,718	100,668
Indigo.....pounds...	5,289	3,923
Linseed oil.....gallons...	9,117	27,116
Spirits of turpentine.....gallons...	88,032	
Spirits from grain.....gallons...	212,970	
Beer, ale, porter, and cider, (in casks,).....gallons...	57,813	143,966
Beer, ale, porter, and cider, (in bottles,).....dozens...	25,003	
Vinegar.....	.....	5,801
Spirits from molasses.....gallons...	194,264	70,213
Molasses.....	.....	621
Sugar, brown.....pounds...	57,025	4,964
Sugar, refined.....pounds...	168,991	27,043
Tobacco.....hogsheads...	64,098	5,347,208
Tobacco, manufactured.....pounds...	2,179,774	210,134
Snuff.....pounds...	61,801	
Wood, and its products—		
Staves and heading..... thousand...	28,193	
Shingles..... thousand...	71,991	
Boards, plank, and scantling.....M feet...	76,345	1,843,985
Hewn timber.....tons...	7,515	
Other lumber.....	.....	167,709
Masts and spars.....	.....	37,482
Oak-bark and other dye.....	.....	65,120
Ashes, pot and pearl.....tons...	9,210	900,458
Tar and pitch.....barrels...	46,337	254,491
Rosin and turpentine.....barrels...	96,157	

Summary statement of the estimated quantities and valuation of the principal exports of the growth, produce, and manufacture of the United States, during the fiscal year, ending September 30, 1827.
[Condensed from the Annual Report on Commerce and Navigation.]

ARTICLES.	Number and quantities.	Valuation.
Animals and their products—		
Hogs.....number...	18,441	
Pork.....barrels...	73,813	
Bacon and hams.....pounds...	1,864,956	$1,555,698
Lard.....pounds...	6,927,084	
Horned cattle.....number...	3,768	
Beef.....barrels...	90,685	
Tallow.....pounds...	301,983	772,636
Hides.....number...	22,883	
Butter.....pounds...	1,148,480	
Cheese.....pounds...	641,385	184,049
Tallow candles.....pounds...	2,236,397	
Soap.....pounds...	7,591,260	901,751
Horses.....number...	1,666	
Mules.....number...	1,067	173,629
Leather and morocco skins.....	.....	119,545

STATEMENT—Concluded.

ARTICLES.	Number and quantities.	Valuation.
Leather.....pounds...	255,303	
Boots.....pairs...	9,220	$388,525
Shoes.....pairs...	375,260	
Sheep.....number...	8,745	13,586
Skins and furs.....	.....	441,690
Wax.....pounds...	386,767	123,354
Apples.....barrels...	30,648	35,828
Bread stuffs—		
Indian corn.....bushels...	978,664	588,462
Indian meal.....barrels...	131,041	434,002
Wheat.....bushels...	22,182	14,800
Flour.....barrels...	868,492	4,420,081
Rye meal.....barrels...	13,345	47,698
Rye, oats, &c.....	.....	87,284
Rice.....tierces...	133,518	2,343,908
Biscuit, or ship-bread.....barrels...	59,856	210,903
Biscuit, or ship-bread.....kegs...	44,236	
Potatoes.....bushels...	95,748	39,174
Cables and cordage.....cwt...	3,971	63,074
Cotton—		
Sea Island.....pounds...	15,140,798	29,359,545
Other kinds.....pounds...	279,169,317	
Cotton, piece goods—		
Printed and colored.....	.....	45,120
White.....	.....	951,001
Nankeen.....	.....	14,750
Twist, yarn, and thread.....	.....	11,175
All other manufactures.....	.....	137,368
Flaxseed.....bushels...	124,287	188,606
Flax and hemp—		
Cloth and thread.....	.....	11,084
Bags and all other manufactures.....	.....	5,364
Ginseng.....pounds...	253,741	79,566
Hops.....pounds...	88,460	8,284
Indigo.....pounds...	13,589	8,358
Linseed oil.....gallons...	9,673	20,704
Spirits of turpentine.....gallons...	31,529	
Spirits from grain.....gallons...	227,747	144,832
Beer, ale, porter, and cider, (in casks,).....gallons...	62,104	
Beer, ale, porter, and cider, (in bottles,).....dozen...	25,085	
Vinegar.....	.....	8,182
Spirits from molasses.....gallons...	260,924	97,003
Molasses.....	.....	1,511
Sugar, brown.....pounds...	18,703	1,489
Sugar, refined.....pounds...	236,744	34,012
Tobacco.....hogsheads...	100,025	6,577,123
Tobacco, manufactured.....pounds...	2,730,255	239,024
Snuff.....pounds...	45,812	
Wood and its products—		
Staves and heading.....thousand...	24,192	1,515,162
Shingles.....thousand...	37,696	
Boards, plank, and scantling.....M feet...	82,003	
Hewn timber.....tons...	5,940	
Other lumber.....	.....	144,548
Masts and spars.....	.....	37,460
Oak-bark and other dye.....	.....	79,884
Ashes, pot and pearl.....tons...	3,810	643,171
Tar and pitch.....barrels...	55,737	402,489
Rosin and turpentine.....barrels...	141,728	

Summary statement of the estimated quantities and valuation of the principal exports of the growth, produce, and manufacture of the United States, during the fiscal year, ending September 30, 1828.
[Condensed from the Annual Report on Commerce and Navigation.]

ARTICLES.	Number and quantities.	Valuation.
Animals and their products—		
Hogs.....number...	16,171	
Pork.....barrels...	53,836	$1,495,830
Bacon and hams.....pounds...	1,837,920	
Lard.....pounds...	7,493,319	
Horned cattle.....number...	1,193	
Beef.....barrels...	66,640	719,961
Tallow.....pounds...	422,130	
Hides.....number...	39,642	
Butter.....pounds...	1,184,329	176,354
Cheese.....pounds...	688,548	
Tallow candles.....pounds...	2,348,501	912,322
Soap.....pounds...	7,782,039	
Horses.....number...	1,442	185,543
Mules.....number...	1,377	
Leather and morocco skins.....	.....	81,221
Leather.....pounds...	233,391	
Boots.....pairs...	6,245	401,259
Shoes.....pairs...	401,188	
Sheep.....number...	5,545	7,499
Skins and furs.....	.....	626,235
Wax.....pounds...	486,530	134,886
Apples.....barrels...	13,839	22,700
Bread stuffs—		
Indian corn.....bushels...	704,902	342,824
Indian meal.....barrels...	174,639	480,034
Wheat.....bushels...	8,906	6,730
Flour.....barrels...	860,809	4,286,939
Rye meal.....barrels...	22,214	59,036
Rye, oats, &c.....	.....	67,997
Rice.....tierces...	175,019	2,620,696
Biscuit, or ship-bread.....barrels...	51,494	171,105
Biscuit, or ship-bread.....kegs...	35,191	
Potatoes.....bushels...	94,898	35,371
Cables and cordage.....cwt...	2,425	20,030
Cotton—		
Sea Island.....pounds...	11,288,419	22,487,229
Other kinds.....pounds...	199,302,044	
Cotton, piece goods—		
Printed and colored.....	.....	76,012
White.....	.....	887,628
Nankeen.....	.....	5,149
Twist, yarn, and thread.....	.....	12,570
All other manufactures.....	.....	28,873
Flaxseed.....bushels...	118,492	144,095
Flax and hemp—		
Cloth and thread.....	.....	5,335
Bags, and all other manufactures.....	.....	3,365
Ginseng.....pounds...	220,396	91,164
Hops.....pounds...	375,058	25,432
Indigo.....pounds...	2,648	1,495
Linseed oil.....gallons...	9,200	22,119
Spirits of turpentine.....gallons...	32,547	
Spirits from grain.....gallons...	468,888	203,780
Beer, ale, porter, and cider, (in casks,).....gallons...	37,690	
Beer, ale, porter, and cider, (in bottles,).....dozen...	20,574	
Vinegar.....	.....	5,884
Spirits from molasses.....gallons...	506,052	185,096
Molasses.....	.....	601

STATEMENT—Concluded.

ARTICLES.	Number and quantities.	Valuation.
Sugar, brown.....pounds...	54,035	$4,095
Sugar, refined.....pounds...	269,291	38,207
Tobacco.....hogsheads...	96,278	5,269,960
Tobacco, manufactured.....pounds...	2,637,411	210,747
Snuff.....pounds...	35,655	
Wood and its products—		
Staves and heading.....thousand...	25,981	1,629,249
Shingles.....thousand...	51,672	
Boards, plank, and scantling.....M feet...	86,981	
Hewn timber.....tons...	4,523	
Other lumber.....	.....	182,303
Masts and spars.....	.....	10,354
Oak-bark and other dye.....	.....	101,175
Ashes, pot and pearl.....tons...	8,501	761,370
Tar and pitch.....barrels...	68,668	487,761
Rosin and turpentine.....barrels...	163,443	

Summary statement of the estimated quantities and valuation of the principal exports of the growth, produce, and manufacture of the United States, during the fiscal year, ending September 30, 1829.
[Condensed from the Annual Report on Commerce and Navigation.]

ARTICLES.	Number and quantities.	Valuation.
Animals and their products—		
Hogs.....number...	10,779	$1,493,629
Pork.....barrels...	59,539	
Bacon and hams.....pounds...	2,305,405	
Lard.....pounds...	7,154,742	
Horned cattle.....number...	2,044	674,955
Beef.....barrels...	51,100	
Tallow.....pounds...	491,106	
Hides.....number...	44,282	
Butter.....pounds...	969,137	176,205
Cheese.....pounds...	916,695	
Tallow candles.....pounds...	2,522,975	692,691
Soap.....pounds...	5,441,303	
Horses.....number...	1,985	207,858
Mules.....number...	1,299	
Leather and morocco skins.....	.....	80,173
Leather.....pounds...	259,586	356,658
Boots.....pairs...	6,324	
Shoes.....pairs...	359,041	
Sheep.....number...	6,846	10,644
Skins and furs.....	.....	526,507
Wax.....pounds...	532,422	132,939
Apples.....barrels...	8,193	15,958
Bread stuffs—		
Indian corn.....bushels...	897,656	478,862
Indian meal.....barrels...	173,775	495,673
Wheat.....bushels...	4,007	6,372
Flour.....barrels...	837,385	5,793,651
Rye meal.....barrels...	34,191	127,004
Rye, oats, &c.....	.....	74,896
Rice.....tierces...	171,636	2,811,370

STATEMENT—Concluded.

ARTICLES.	Number and quantities.	Valuation.
Biscuit, or ship-bread.....barrels...	44,254	$172,897
Biscuit, or ship-bread.....kegs...	26,849	
Potatoes.....bushels...	77,226	30,079
Cables and cordage..... cwt...	660	7,984
Cotton—		
Sea Island..... pounds...	12,833,307	26,575,311
Other kinds..... pounds...	252,003,879	
Cotton, piece goods—		
Printed and colored.....	.....	145,024
White	.....	981,370
Nankeen	.....	1,878
Twist, yarn, and thread	.....	3,849
All other manufactures.....	.....	127,336
Flaxseed.....bushels...	68,758	113,040
Flax and hemp—		
Cloth and thread.....	.....	2,166
Bags and all other manufactures.....	.....	14,954
Ginseng..... pounds...	411,602	114,396
Hops.....pounds...	128,482	6,917
Linseed oil.....gallons...	5,322	30,442
Spirits of turpentine.....gallons...	184,199	
Spirits from grain.....gallons...	591,109	
Beer, ale, porter, and cider, (in casks,)..... gallons...	36,563	215,494
Beer, ale, porter, and cider, (in bottles,).....dozen...	14,024	
Vinegar.....	.....	5,953
Spirits from molasses.....gallons...	464,225	166,740
Molasses.....	.....	1,992
Sugar, brown..... pounds...	53,778	3,289
Sugar, refined..... pounds...	479,218	50,739
Tobacco..... hogsheads...	77,131	4,982,974
Tobacco, manufactured.....pounds...	2,619,399	202,396
Snuff.....pounds...	19,509	
Wood and its products—		
Staves and heading.....thousand...	29,253	
Shingles.....thousand...	62,459	
Boards, plank, and scantling.....M feet...	75,257	1,553,828
Hewn timber.....tons...	36,435	
Other lumber.....	.....	126,575
Masts and spars.....	.....	17,768
Oak-bark and other dye.....	.....	165,406
Ashes, pot and pearl.....tons...	6,881	817,434
Tar and pitch.....barrels...	48,329	377,613
Rosin and turpentine.....barrels...	142,761	

Summary statement of the estimated quantities and valuation of the principal exports of the growth, produce, and manufacture of the United States, during the fiscal year, ending September 30, 1830.
[Condensed from the Annual Report on Commerce and Navigation.]

ARTICLES.	Number and quantities.	Valuation.
Animals and their products—		
Hogs.....number...	22,294	
Pork.....barrels...	45,645	$1.315.245
Bacon and hams.....pounds...	2,154,986	
Lard.....pounds ..	6 001.417	

STATEMENT—Continued.

ARTICLES.		Number and quantities.	Valuation.
Horned cattle	number...	4,125	
Beef	barrels...	46,842	$ 717,683
Tallow	pounds...	533,436	
Hides	number...	50,146	
Butter	pounds...	899,396	142,370
Cheese	pounds...	688,241	
Tallow candles	pounds...	2,443,045	619,238
Soap	pounds...	5,361,467	
Horses	number...	2,138	182,244
Mules	number...	695	
Leather and morocco skins			70,568
Leather	pounds...	244,214	
Boots	pairs...	4,253	338,303
Shoes	pairs...	355,875	
Sheep	number...	15,460	22,110
Skins and furs			641,760
Wax	pounds...	581,201	153,866
Apples	barrels...	14,458	23,727
Bread stuffs—			
Indian corn	bushels...	444,107	224,823
Indian meal	barrels...	145,301	372,296
Wheat	bushels...	45,286	46,176
Flour	barrels...	1,227,434	6,085,953
Rye meal	barrels...	26,298	87,796
Rye, oats, &c.			66,249
Rice	tierces...	130,697	1,986,824
Biscuit, or ship-bread	barrels...	57,101	188,474
Biscuit, or ship-bread	kegs...	38,592	
Potatoes	bushels...	105,620	39,027
Cables and cordage	cwt...	351	4,135
Cotton—			
Sea Island	pounds...	8,147,165	29,674,883
Other kinds	pounds...	290,311,937	
Cotton, piece goods—			
Printed and colored			61,800
White			964,196
Nankeen			1,098
Twist, yarn, and thread			24,744
All other manufactures			266,350
Flaxseed	bushels...	115,762	180,973
Flax and hemp—			
Cloth and thread			2,152
Bags and all other manufactures			1,779
Ginseng	pounds...	321,692	67,852
Hops	pounds...	383,060	30,312
Indigo	pounds...	1,140	827
Linseed oil	gallons...	3,914	35,039
Spirits of turpentine	gallons...	78,629	
Salt	bushels...	47,488	22,978
Spirits from grain	gallons...	653,290	
Beer, ale, porter, and cider, (in casks,)	gallons...	52,397	225,357
Beer, ale, porter, and cider, (in bottles,)	dozen...	17,536	
Vinegar			6,690
Spirits from molasses	gallons...	753,160	49,798
Molasses			3,968
Sugar, brown	pounds...	37,646	2,975
Sugar, refined	pounds...	1,586,220	193,084
Tobacco	hogsheads...	83,810	5,586,365
Tobacco, manufactured	pounds...	3,199,151	246,747
Snuff	pounds...	29,425	

STATEMENT—Concluded.

ARTICLES.	Number and quantities.	Valuation.
Wood and its products—		
Staves and heading.....thousand...	23,069	
Shingles.....thousand...	41,175	$1,501,658
Boards, plank, and scantling.....M feet...	67,300	
Hewn timber.....tons...	19,203	
Other lumber.....	.....	148,257
Masts and spars.....	.....	13,327
Oak-bark and other dye.....	.....	220,275
Ashes, pot and pearl.....tons...	8,957	1,105,127
Tar and pitch..... barrels...	44,343	321,119
Rosin and turpentine.....barrels...	120,722	

Summary statement of the estimated quantities and valuation of the principal exports of the growth, produce, and manufacture of the United States, during the fiscal year, ending September 30, 1831.
[Condensed from the Annual Report on Commerce and Navigation.]

ARTICLES.	Number and quantities.	Valuation.
Animals and their products—		
Hogs.....number...	14,690	
Pork.....barrels...	51,263	$1,501,644
Bacon and hams.....pounds...	1,477,446	
Lard.....pounds...	6,963,516	
Horned cattle.....number...	5,881	
Beef.....barrels...	60,770	829,982
Tallow.....pounds...	679,623	
Hides.....number...	299,473	
Butter.....pounds...	1,728,213	264,796
Cheese.....pounds...	1,131,817	
Tallow candles.....pounds...	2,669,211	643,252
Soap.....pounds...	5,752,430	
Horses.....number...	2,184	218,015
Mules.....number...	1,540	
Leather and morocco skins.....	.....	58,146
Leather.....pounds...	316,795	
Boots.....pairs...	4,777	290,937
Shoes.....pairs...	257,150	
Sheep.....number...	8,262	14,499
Skins and furs.....	.....	750,938
Wax.....pounds...	430,929	114,017
Apples.....barrels...	16,375	31,148
Bread stuffs—		
Indian corn.....bushels...	571,312	396,617
Indian meal.....barrels...	207,604	595,434
Wheat.....bushels...	408,910	523,270
Flour.....barrels...	1,806,529	9,938,458
Rye meal.....barrels...	19,100	71,881
Rye, oats, &c.....	.....	132,717
Rice.....tierces...	116,517	2,016,267
Biscuit, or ship-bread.....barrels...	67,113	250,533
Biscuit, or ship-bread.....kegs...	46,048	
Potatoes.....bushels...	112,875	41,147
Cables and cordage.....cwt....	622	6,109
Cotton—		
Sea Island.....pounds...	8,311,762	25,289,492
Other kinds.....pounds...	268,668,022	

STATEMENT—Concluded.

ARTICLES.	Number and quantities.	Valuation.
Cotton, piece goods—		
Printed and colored		$96,931
White		947,932
Nankeen		2,397
Twist, yarn, and thread		17,221
All other manufactures		61,832
Flaxseed ..... bushels...	120,702	216,376
Flax and hemp—		
Cloth and thread		231
Bags and all other manufactures		2,599
Ginseng ..... pounds...	357,002	115,928
Hops ..... pounds...	265,043	26,664
Linseed oil ..... gallons...	8,643	54,092
Spirits of turpentine ..... gallons...	131,934	
Salt ..... bushels...	45,847	26,848
Spirits from grain ..... gallons...	326,491	
Beer, ale, porter, and cider, (in casks,) ..... gallons...	76,856	141,794
Beer, ale, porter, and cider, (in bottles,) ..... dozen...	17,875	
Vinegar		7,178
Spirits from molasses ..... gallons...	110,554	34,589
Molasses		948
Sugar, brown ..... pounds...	180,132	10,105
Sugar, refined ..... pounds...	2,057,487	215,794
Tobacco ..... hogsheads...	86,718	4,892,388
Tobacco, manufactured ..... pounds...	3,639,856	292,475
Snuff ..... pounds...	27,967	
Wood and its products—		
Staves and heading ..... thousand...	22,838	
Shingles ..... thousand...	33,122	1,467,065
Boards, plank, and scantling ..... M. feet...	65,045	
Hewn timber ..... tons...	32,335	
Other lumber		214,105
Masts and spars		7,806
Oak-bark and other dye		99,116
Ashes, pot and pearl ..... tons...	10,219	935,613
Tar and pitch ..... barrels...	52,995	397,687
Rosin and turpentine ..... barrels...	156,319	

Summary statement of the estimated quantities and valuation of the principal exports of the growth, produce, and manufacture of the United States, during the fiscal year, ending September 30, 1832.
[Condensed from the Annual Report on Commerce and Navigation.]

ARTICLES.	Number and quantities.	Valuation
Animals and their products—		
Hogs ..... number...	5,266	
Pork ..... barrels...	88,625	$1,928,196
Bacon and hams ..... pounds...	1,810,880	
Lard ..... pounds...	7,756,782	
Horned cattle ..... number...	8,123	
Beef ..... barrels...	55,507	774,087
Tallow ..... pounds...	622,522	
Hides ..... number...	52,110	

STATEMENT—Concluded.

ARTICLES.	Number and quantities.	Valuation.
Butter.....pounds...	1,501,686	$290,820
Cheese.....pounds...	1,391,853	
Tallow candles.....pounds...	2,498,776	701,184
Soap.....pounds...	5,743,602	
Horses.....number...	1,798	164,034
Mules.....number...	1,128	
Leather and morocco skins.....	.....	42,565
Leather.....pounds...	318,590	
Boots.....pairs...	4,215	277,388
Shoes.....pairs...	263,081	
Sheep.....number...	12,260	22,385
Skins and furs.....	.....	691,909
Wax.....pounds...	258,559	62,444
Apples.....barrels...	6,928	15,314
Bread stuffs—		
Indian corn.....bushels...	451,230	278,740
Indian meal.....barrels...	146,710	480,035
Wheat.....bushels...	88,304	93,500
Flour.....barrels...	864,919	4,880,623
Rye meal.....barrels...	17,254	75,392
Rye, oats, &c.....	.....	78,447
Rice.....tierces...	120,327	2,152,631
Biscuit, or ship-bread.....barrels...	73,883	255,735
Biscuit, or ship-bread.....kegs...	29,208	
Potatoes.....bushels...	106,517	42,077
Cables and cordage.....cwt...	1,086	13,863
Cotton—		
Sea Island.....pounds...	8,743,373	31,724,682
Other kinds.....pounds...	313,471,749	
Cotton, piece goods—		
Printed and colored.....	.....	104,870
White.....	.....	1,052,891
Nankeen.....	.....	341
Twist, yarn, and thread.....	.....	12,618
All other manufactures.....	.....	58,854
Flaxseed.....bushels...	57,537	123,036
Flax and hemp—		
Cloth and thread.....	.....	1,570
Bags and all other manufactures.....	.....	2,685
Ginseng.....pounds...	408,404	99,545
Hops.....pounds...	184,729	25,448
Linseed oil.....gallons...	4,495	33,304
Spirits of turpentine.....gallons...	71,766	
Salt.....bushels...	45,072	27,914
Spirits from grain.....gallons...	258,961	
Beer, ale, porter, and cider, (in casks,).....gallons...	40,988	127,583
Beer, ale, porter, and cider, (in bottles,).....dozen...	12,120	
Vinegar.....	.....	4,677
Spirits from molasses.....gallons...	119,416	38,221
Molasses.....	.....	2,493
Sugar, brown.....pounds...	154,160	11,232
Sugar, refined.....pounds...	701,862	74,673
Tobacco.....hogsheads...	106,806	5,999,769
Tobacco, manufactured.....pounds...	3,456,071	295,771
Snuff.....pounds...	31,175	
Wood and its products—		
Staves and heading.....thousand...	20,282	
Shingles.....thousand...	39,123	
Boards, plank, and scantling.....M. feet...	67,820	1,522,053
Hewn timber.....tons...	26,439	
Other lumber.....	.....	188,608
Masts and spars.....	.....	73,368

STATEMENT—Concluded.

ARTICLES.	Number and quantities.	Valuation.
Oak-bark and other dye		$52,944
Ashes, pot and pearl ..... tons...	8,859	930,398
Tar and pitch ..... barrels...	47,523	476,291
Rosin and turpentine ..... barrels...	168,770	

Summary statement of the estimated quantities and valuation of the principal exports of the growth, produce, and manufacture of the United States, during the fiscal year, ending September 30, 1833.
[Condensed from the Annual Report on Commerce and Navigation.]

ARTICLES.	Number and quantities.	Valuation
Animals and their products—		
Hogs ..... number...	6,819	
Pork ..... barrels..	105,870	
Bacon and hams ..... pounds...	1,786,637	$2,151,558
Lard ..... pounds...	7,655,198	
Horned cattle ..... number...	6,837	
Beef ..... barrels...	64,322	
Tallow ..... pounds...	676,841	958,076
Hides ..... number...	58,179	
Butter ..... pounds...	1,346,364	
Cheese ..... pounds...	1,213,092	258,452
Tallow candles ..... pounds...	2,410,385	
Soap ..... pounds...	5,537,161	673,676
Horses ..... number...	2,040	
Mules ..... number...	1,011	167,330
Leather and morocco skins		38,267
Leather ..... pounds...	275,453	
Boots ..... pairs...	9,628	
Shoes ..... pairs...	167,622	213,510
Sheep ..... number...	11,821	21,464
Skins and furs		841,983
Wax ..... pounds...	783,843	178,748
Apples ..... barrels...	17,075	33,262
Bread stuffs—		
Indian corn ..... bushels...	487,174	33[illegible],505
Indian meal ..... barrels...	146,678	534,309
Wheat ..... bushels...	32,221	29,592
Flour ..... barrels...	955,768	5,613,010
Rye meal ..... barrels...	36,038	140,017
Rye, oats, &c.		102,568
Rice ..... tierces...	144,163	2,744,418
Biscuit, or ship-bread ..... barrels...	72,642	
Biscuit, or ship-bread ..... kegs...	23,718	252,555
Potatoes ..... bushels...	136,127	52,052
Cables and cordage ..... cwt...	10,342	23,140
Cotton—		
Sea Island ..... pounds...	11,142,987	
Other kinds ..... pounds...	313,555,617	36,191,105
Cotton, piece goods—		
Printed and colored		421,721
White		1,802,116
Nankeen		2,054
Twist, yarn, and thread		104,235
All other manufactures		202,291

STATEMENT—Concluded.

ARTICLES.	Number and quantities.	Valuation.
Flaxseed.....bushels...	117,292	$228,300
Flax and hemp—		
Cloth and thread.....	.....	5,964
Bags, and all other manufactures.....	.....	18,985
Ginseng.....pounds...	546,878	183,194
Hops.....pounds...	468,798	92,963
Indigo.....pounds...	300	180
Linseed oil.....gallons...	3,159	30,293
Spirits of turpentine.....gallons...	71,654	
Salt.....bushels...	25,069	18,211
Spirits from grain.....gallons...	295,695	144,069
Beer, ale, porter, and cider, (in casks,).....gallons...	65,044	
Beer, ale, porter, and cider, (in bottles,).....dozen...	14,658	
Vinegar.....	.....	3,347
Spirits from molasses.....gallons...	79,693	28,463
Molasses.....	.....	2,279
Sugar, brown.....pounds...	100,340	7,635
Sugar, refined.....pounds...	416,736	40,327
Tobacco.....hogsheads...	83,153	5,755,968
Tobacco, manufactured.....pounds...	3,790,310	288,973
Snuff.....pounds...	13,453	
Wood, and its products—		
Staves and heading..... thousand...	30,984	1,969,191
Shingles..... thousand...	40,956	
Boards, plank, and scantling.....M. feet...	76,755	
Hewn timber.....tons...	20,247	
Other lumber.....	.....	249,036
Masts and spars.....	.....	32,625
Oak-bark and other dye.....	.....	93,609
Ashes, pot and pearl.....tons...	11,052	814,398
Tar and pitch.....barrels...	41,024	483,712
Rosin and turpentine.....barrels...	176,146	

Summary statement of the estimated quantities and valuation of the principal exports of the growth, produce, and manufacture of the United States, during the fiscal year, ending September 30, 1834.
[Condensed from the Annual Report on Commerce and Navigation.]

ARTICLES.	Number and quantities.	Valuation.
Animals and their products—		
Hogs.....number...	3,338	$1,796,001
Pork..... barrels...	82,691	
Bacon and hams.....pounds...	1,520,638	
Lard.....pounds...	9,050,342	
Horned cattle.....number...	6,441	755,219
Beef.....barrels...	46,181	
Tallow.....pounds...	771,239	
Hides.....number...	60,015	
Butter.....pounds...	1,084,960	190,099
Cheese.....pounds...	819,567	
Tallow candles.....pounds...	2,950,301	616,692
Soap.....pounds...	4,327,602	
Horses.....number...	2,954	233,554
Mules.....number...	1,000	
Leather and morocco skins.....	.....	11,822

STATEMENT—Concluded.

ARTICLES.	Number and quantities.	Valuation.
Leather.....pounds...	257,813	
Boots.....pairs...	7,874	$177,731
Shoes.....pairs...	134,729	
Sheep.....number...	16,654	29,002
Skins and furs.....	.....	797,844
Wax.....pounds...	364,674	86,803
Apples.....barrels...	25,276	41,849
Bread stuffs—		
Indian corn.....bushels...	303,449	203,573
Indian meal.....barrels...	149,609	491,910
Wheat.....bushels...	36,948	39,598
Flour.....barrels...	835,352	4,520,781
Rye meal.....barrels...	39,151	140,306
Rye, oats, &c.....	.....	49,465
Rice.....tierces...	121,886	2,122,272
Biscuit, or ship-bread.....barrels...	66,309	231,708
Biscuit, or ship-bread.....kegs...	25,161	
Potatoes.....bushels...	97,427	38,567
Cables and Cordage.....cwt...	2,087	22,062
Cotton—		
Sea Island.....pounds...	8,085,937	49,448,402
Other kinds.....pounds...	376,631,970	
Cotton, piece goods—		
Printed and colored.....	.....	188,619
White.....	.....	1,756,136
Nankeen.....	.....	1,061
Twist, yarn, and thread.....	.....	88,376
All other manufactures.....	.....	51,802
Flaxseed.....bushels...	187,468	281,990
Flax and hemp—		
Cloth and thread.....	.....	4,889
Bags, and all other manufactures.....	.....	6,162
Ginseng.....pounds...	181,002	70,202
Hops.....pounds...	917,600	164,577
Indigo.....pounds...	102	148
Linseed oil.....gallons...	15,728	42,912
Spirits of turpentine.....gallons...	54,624	
Salt.....bushels...	89,064	54,007
Spirits from grain.....gallons...	269,046	
Beer, ale, porter, and cider (in casks).....gallons...	51,853	110,601
Beer, ale, porter, and cider (in bottles).....dozen...	7,976	
Vinegar.....	.....	3,805
Spirits from molasses.....gallons...	222,852	73,827
Molasses.....	.....	5,934
Sugar, brown.....pounds...	108,087	6,461
Sugar, refined.....pounds...	2,355,754	219,153
Tobacco.....hogsheads...	87,979	6,595,305
Tobacco, manufactured.....pounds...	3,956,579	328,409
Snuff.....pounds...	57,826	
Wood, and its products—		
Staves and heading.....thousand...	29,797	1,901,628
Shingles.....thousand...	37,917	
Boards, plank, and scantling.....M. feet...	69,996	
Hewn timber.....tons...	20,383	
Other lumber.....	.....	192,098
Masts and spars.....	.....	22,457
Oak bark, and other dye.....	.....	71,747
Ashes, pot and pearl.....tons...	6,481	557,500
Tar and pitch.....barrels...	49,792	525,399
Rosin and turpentine.....barrels...	172,391	

Summary statement of the estimated quantities and valuation of the principal exports of the growth, produce, and manufacture of the United States, during the fiscal year, ending September 30, 1835.
[Condensed from the Annual Report on Commerce and Navigation.]

ARTICLES.	Number and quantities.	Valuation.
Animals and their products—		
Hogs.....number...	3,930	
Pork.....barrels...	61,827	$1,776,732
Bacon and hams.....pounds...	1,492,027	
Lard.....pounds...	10,637,490	
Horned cattle.....number...	7,348	
Beef.....barrels...	38,028	638,761
Tallow.....pounds...	491,412	
Hides.....number...	41,495	
Butter.....pounds...	684,624	164,809
Cheese.....pounds...	887,000	
Tallow candles.....pounds...	2,503,883	534,467
Soap.....pounds...	3,708,101	
Horses.....number...	3,616	285,028
Mules.....number...	1,100	
Leather and morocco skins.....	.....	11,847
Leather.....pounds...	355,274	
Boots.....pairs...	5,692	224,722
Shoes.....pairs...	129,781	
Sheep.....number...	19,145	36,566
Skins and furs	.....	759,953
Wax.....pounds...	375,061	93,919
Apples.....barrels...	9,745	20,959
Bread stuffs—		
Indian corn.....bushels...	755,781	588,276
Indian meal.....barrels...	166,782	629,389
Wheat.....bushels...	47,762	51,405
Flour.....barrels...	779,396	4,394,777
Rye meal.....barrels...	30,854	129,140
Rye, oats, &c.....	.....	96,478
Rice.....tierces...	110,851	2,210,331
Biscuit, or ship-bread.....barrels...	59,013	221,699
Biscuit, or ship-bread.....kegs...	36,447	
Potatoes.....bushels...	83,823	41,543
Cables and cordage.....cwt...	2,530	11,686
Cotton—		
Sea Island.....pounds...	7,752,736	64,961,362
Other kinds.....pounds...	379,606,256	
Cotton, piece goods—		
Printed and colored.....	.....	397,412
White.....	.....	2,355,202
Nankeen	.....	400
Twist, yarn, and thread.....	.....	97,808
All other manufactures.....	.....	7,859
Flaxseed.....bushels...	228,863	451,886
Flax and hemp—		
Cloth and thread.....	.....	795
Bags and all other manufactures.....	.....	1,575
Ginseng.....pounds...	308,020	94,960
Hops.....pounds...	625,684	90,720
Indigo.....pounds...	1,031	1,060
Linseed oil.....gallons...	2,370	47,728
Spirits of turpentine.....gallons...	81,837	
Salt.....bushels...	126,230	46,483
Spirits from grain.....gallons...	264,857	
Beer, ale, porter, and cider, (in casks,)..... gallons...	78,644	134,823
Beer, ale, porter, and cider, (in bottles,).....dozen...	12,541	

STATEMENT—Concluded.

ARTICLES.	Number and quantities.	Valuation.
Vinegar		$4,540
Spirits from molasses, gallons	507,970	158,544
Molasses		1,963
Sugar, brown, pounds	102,431	8,526
Sugar, refined, pounds	768,075	62,293
Tobacco, hogsheads	94,353	8,250,577
Tobacco, manufactured, pounds	3,817,854	357,611
Snuff, pounds	36,471	
Wood and its products—		
Staves and heading, thousand	57,636	
Shingles, thousand	39,288	
Boards, plank, and scantling, M. feet	153,671	2,635,056
Hewn timber, tons	36,020	
Other lumber		247,032
Masts and spars		29,437
Oak-bark and other dye		73,877
Ashes, pot and pearl, tons	6,448	571,591
Tar and pitch, barrels	51,248	567,566
Rosin and turpentine, barrels	170,282	

Summary statement of the estimated quantities and valuation of the principal exports of the growth, produce, and manufacture of the United States, during the fiscal year, ending September 30, 1836.
[Condensed from the Annual Report on Commerce and Navigation.]

ARTICLES.	Number and quantities.	Valuation.
Animals and their products—		
Hogs, number	1,231	
Pork, barrels	22,550	
Bacon and hams, pounds	1,398,475	$1,383,344
Lard, pounds	6,493,878	
Horned cattle, number	4,683	
Beef, barrels	50,226	
Tallow, pounds	443,765	699,116
Hides, number	39,379	
Butter, pounds	361,895	
Cheese, pounds	486,234	114,033
Tallow candles, pounds	2,275,943	
Soap, pounds	2,796,110	478,310
Horses, number	4,553	
Mules, number	875	346,689
Leather and morocco skins		21,367
Leather, pounds	337,335	
Boots, pairs	3,563	133,471
Shoes, pairs	51,440	
Sheep, number	6,342	18,548
Skins and furs		653,662
Wax, pounds	311,807	91,676
Apples, barrels	22,235	39,668
Bread stuffs—		
Indian corn, bushels	124,791	103,702
Indian meal, barrels	140,917	621,560
Wheat, bushels	2,062	2,062
Flour, barrels	505,400	3,572,599
Rye meal, barrels	36,646	173,976

STATEMENT—Concluded.

ARTICLES.	Number and quantities.	Valuation.
Rye, oats, &c.		$80,492
Rice ..... tierces...	212,983	2,548,750
Biscuit or ship-bread.....barrels...	55,986	244,760
Biscuit or ship-bread.....kegs...	30,691	
Potatoes.....bushels...	91,581	43,630
Cables and cordage.....cwt...	525	8,502
Cotton—		
Sea Island .....pounds...	8,544,419	71,284,925
Other kinds..... .....pounds...	415,086,888	
Cotton, piece goods—		
Printed and colored.....		256,625
White.....		1,950,795
Nankeen.....		637
Twist, yarn, and thread.....		32,765
All other manufactures.....		14,912
Flaxseed.....bushels...	123,926	250,182
Flax and hemp—		
Cloth and thread.....		6,729
Bags, and all other manufactures.....		7,385
Ginseng .....pounds...	465,619	211,405
Hops.....pounds...	207,548	25,886
Indigo.....pounds...	1,065	1,020
Linseed oil.....gallons...	1,785	51,910
Spirits of turpentine.....gallons...	84,261	
Salt.....bushels...	49,917	31,943
Spirits from grain.....gallons...	180,965	117,032
Beer, ale, porter, and cider, (in casks,).....gallons...	79,758	
Beer, ale, porter, and cider, (in bottles,).....dozen...	15,592	
Vinegar.....		3,634
Spirits from molasses.....gallons...	92,228	34,721
Molasses.....		851
Sugar, brown.....pounds...	128,119	12,342
Sugar, refined.....pounds...	1,442,989	165,648
Tobacco .....hogsheads...	109,442	10,058,640
Tobacco, manufactured .....pounds...	3,246,675	435,464
Snuff..... .....pounds...	46,018	
Wood, and its products—		
Staves and heading.....thousand...	23,346	2,153,623
Shingles.....thousand...	43,604	
Boards, plank, and scantling.....M. feet...	76,950	
Hewn timber.....tons...	28,744	
Other lumber.....		195,188
Masts and spars.....		22,106
Oak-bark and other dye.....		68,758
Ashes, pot and pearl.....tons...	6,003	723,606
Tar and pitch.....barrels...	49,433	912,376
Rosin and turpentine.....barrels...	216,418	

Summary statement of the estimated quantities and valuation of the principal exports of the growth, produce, and manufacture of the United States, during the fiscal year, ending September 30, 1837.
[Condensed from the Annual Report on Commerce and Navigation.]

ARTICLES.	Number and quantities.	Valuation.
Animals and their products—		
Hogs.....number...	1,110	
Pork.....barrels...	24,583	$1,209,796
Bacon and hams.....pounds...	965,935	
Lard.....pounds...	6,388,174	
Horned cattle.....number...	3,237	
Beef.....barrels...	28,076	
Tallow.....pounds...	168,795	585,146
Hides.....number...	112,096	
Butter.....pounds...	281,939	
Cheese.....pounds...	411,338	96,176
Tallow candles.....pounds...	1,606,424	
Soap.....pounds...	2,208,497	393,031
Horses.....number...	5,022	
Mules.....number...	764	368,094
Leather and morocco skins.....	.....	21,316
Leather.....pounds...	202,006	
Boots.....pairs...	2,388	114,553
Shoes.....pairs...	62,286	
Sheep.....number...	3,460	16,852
Skins and furs.....	.....	651,908
Wax.....pounds...	311,202	91,168
Apples.....barrels...	20,594	40,990
Bread stuffs—		
Indian corn.....bushels...	151,276	147,982
Indian meal.....barrels...	159,435	763,652
Wheat.....bushels...	17,303	27,206
Flour.....barrels...	318,719	2,987,269
Rye meal.....barrels...	28,323	165,457
Rye, oats, &c.....	.....	80,785
Rice.....tierces...	106,084	2,309,279
Biscuit, or ship-bread.....barrels...	43,308	244,292
Biscuit, or ship-bread.....kegs...	17,606	
Potatoes.....bushels...	100,703	53,630
Cables and cordage.....cwt...	1,260	15,327
Cotton—		
Sea Island.....pounds...	5,286,971	63,240,102
Other kinds.....pounds...	438,924,566	
Cotton, piece goods—		
Printed and colored.....	.....	549,801
White.....	.....	2,043,115
Nankeen.....	.....	1,815
Twist, yarn, and thread.....	.....	61,702
All other manufactures.....	.....	175,040
Flaxseed.....bushels...	33,147	50,553
Flax and hemp—		
Cloth and thread.....	.....	18,422
Bags, and all other manufactures.....	.....	29,898
Ginseng.....pounds...	215,007	109,398
Hops.....pounds...	1,096,428	89,705
Linseed oil.....gallons...	4,660	59,726
Spirits of turpentine.....gallons...	112,602	
Salt.....bushels...	99,133	58,472
Spirits from grain.....gallons...	231,957	145,519
Beer, ale, porter, and cider, (in casks,).....gallons...	92,280	
Beer, ale, porter, and cider, (in bottles,).....dozen...	17,653	
Vinegar.....	.....	4,313
Spirits from molasses.....gallons...	141,556	53,513
Molasses.....	.....	7,171

STATEMENT—Concluded.

ARTICLES.	Number and quantities.	Valuation.
Sugar, brown ..... pounds...	306,602	$22,668
Sugar, refined ..... pounds...	1,844,167	215,728
Tobacco ..... hogsheads...	100,232	5,795,647
Tobacco, manufactured ..... pounds...	3,615,591	427,836
Snuff ..... pounds...	40.883	
Wood and its products—		
Staves and heading ..... thousand...	20,880	2,333,663
Shingles ..... thousand...	42,108	
Boards, plank, and scantling ..... M. feet...	88,721	
Hewn timber ..... tons...	17,187	
Other lumber	.....	251,083
Masts and spars	.....	30,654
Oak-bark and other dye	.....	96,443
Ashes, pot and pearl ..... tons...	6,565	731,596
Tar and pitch ..... barrels...	42,303	823,410
Rosin and turpentine ..... barrels...	216,624	

Summary statement of the estimated quantities and valuation of the principal exports of the growth, produce, and manufacture of the United States, during the fiscal year, ending September 30, 1838.
[Condensed from the Annual Report on Commerce and Navigation.]

ARTICLES.	Number and quantities.	Valuation.
Animals and their products—		
Hogs ..... number...	366	$1,312,346
Pork ..... barrels...	31,356	
Bacon and hams ..... pounds...	1,194,890	
Lard ..... pounds...	7,209,478	
Horned cattle ..... number...	2,826	528,231
Beef ..... barrels...	23,491	
Tallow ..... pounds...	363,036	
Hides ..... number...	56,762	
Butter ..... pounds...	495,108	148,191
Cheese ..... pounds...	664,660	
Tallow candles ..... pounds...	1,820,145	513,721
Soap ..... pounds...	3,105,714	
Horses ..... number...	4,418	331,620
Mules ..... number...	409	
Leather and morocco skins	.....	28,071
Leather ..... pounds...	172,958	132,476
Boots ..... pairs...	8,131	
Shoes ..... pairs...	79,105	
Sheep ..... number...	6,698	20,462
Skins and furs	.....	633,945
Wax ..... pounds...	241,819	67,181
Apples ..... barrels...	20,157	41,121
Bread stuffs—		
Indian corn ..... bushels...	172,321	141,992
Indian meal ..... barrels...	171,843	722,399
Wheat ..... bushels...	6,291	8,125
Flour ..... barrels...	448,161	3,603,299
Rye meal ..... barrels...	22,864	110,792
Rye, oats, &c	.....	94,533
Rice ..... tierces...	71,048	1,721,819
Biscuit, or ship-bread ..... barrels...	49,566	263,686
Biscuit, or ship-bread ..... kegs...	21,633	

STATEMENT—Concluded.

ARTICLES.	Number and quantities.	Valuation.
Potatoes.....bushels...	118,627	$56,898
Cables and cordage.....cwt...	1,814	21,547
Cotton—		
Sea Island.....pounds...	7,286,340	61,556,811
Other kinds.....pounds...	588,665,957	
Cotton, piece goods—		
Printed and colored.....	.....	252,044
White.....	.....	3,250,130
Nankeen.....	.....	6,077
Twist, yarn, and thread.....	.....	168,021
All other manufactures.....	.....	82,543
Flaxseed.....bushels...	35,651	55,954
Flax and hemp—		
Cloth and thread.....	.....	1,244
Bags and all other manufactures.....	.....	2,146
Ginseng.....pounds...	69,187	36,622
Hops.....pounds...	854,106	53,602
Indigo.....pounds...	50	50
Linseed oil.....gallons...	5,604	94,295
Spirits of turpentine.....gallons...	225,231	
Salt.....bushels...	114,155	67,707
Spirits from grain.....gallons...	226,962	165,316
Beer, ale, porter, and cider, (in casks,).....gallons...	108,897	
Beer, ale, porter, and cider, (in bottles,).....dozen...	24,211	
Vinegar.....	.....	5,241
Spirits from molasses.....gallons...	249,356	99,473
Molasses.....	.....	6,626
Sugar, brown.....pounds...	408,802	30,487
Sugar, refined.....pounds...	2,610,649	249,671
Tobacco.....hogsheads...	100,593	7,392,029
Tobacco, manufactured.....pounds...	5,008,147	577,420
Snuff.....pounds...	75,083	
Wood, and its products—		
Staves and heading.....thousand...	24,177	2,102,053
Shingles.....thousand...	36,007	
Boards, plank, and scantling.....M. feet...	87,217	
Hewn timber.....tons...	21,238	
Other lumber.....	.....	267,134
Masts and spars.....	.....	36,150
Oak-bark and other dye.....	.....	161,694
Ashes, pot and pearl.....tons...	7,745	710,342
Tar and pitch.....barrels...	33,629	703,394
Rosin and turpentine.....barrels...	245,860	

Summary statement of the estimated quantities and valuation of the principal exports of the growth, produce, and manufacture of the United States, during the fiscal year, ending September 30th, 1839.
[Condensed from the Annual Report on Commerce and Navigation.]

ARTICLES.	Number and quantities.	Valuation
Animals and their products—		
Hogs.....number...	772	$1,777,230
Pork.....barrels...	41,301	
Bacon and hams.....pounds...	1,445,527	
Lard.....pounds...	7,723,834	

STATEMENT—Continued.

ARTICLES.	Number and quantities.	Valuation.
Horned cattle.....number...	1,775	
Beef.....barrels...	16,189	$371,646
Tallow.....pounds...	118,037	
Hides.....number...	33,852	
Butter.....pounds...	424,609	127,550
Cheese.....pounds...	519,017	
Tallow candles.....pounds...	1,310,008	453,471
Soap.....pounds...	3,322,049	
Horses.....number...	3,168	291,625
Mules.....number...	882	
Leather and morocco skins.....	.....	12,952
Leather.....pounds...	336,350	173,859
Boots.....pairs...	9,283	
Shoes.....pairs...	73,587	
Sheep.....number...	6,084	15,960
Skins and furs.....	.....	732,087
Wax.....pounds...	236,520	68,961
Apples.....barrels...	23,470	50,875
Bread stuffs—		
Indian corn.....bushels...	162,306	141,095
Indian meal.....barrels...	165,672	658,421
Wheat.....bushels...	96,325	144,191
Flour.....barrels...	923,151	6,925,170
Rye meal.....barrels...	29,458	145,448
Rye, oats, &c.....	.....	72,050
Rice.....tierces...	93,320	2,460,198
Biscuit, or ship-bread.....barrels...	68,824	349,871
Biscuit, or ship-bread.....kegs...	41,178	
Potatoes.....bushels...	96,569	57,536
Cables and cordage.....cwt...	2,237	25,899
Cotton—		
Sea Island.....pounds...	5,107,404	61,238,982
Other kinds.....pounds...	408,516,808	
Cotton, piece goods—		
Printed and colored.....	.....	412,661
White.....	.....	2,525,301
Nankeen.....	.....	1,492
Twist, yarn, and thread.....	.....	17,465
All other manufactures.....	.....	18,114
Flaxseed.....bushels...	66,781	161,896
Flax and hemp—		
Cloth and thread.....	.....	2,010
Bags, and all other manufactures.....	.....	2,047
Ginseng.....pounds...	319,564	118,904
Hops.....pounds...	747,164	72,425
Linseed oil.....gallons...	3,253	78,757
Spirits of turpentine.....gallons...	178,248	
Salt.....bushels...	264,337	64,272
Spirits from grain.....gallons...	164,845	142,085
Beer, ale, porter, and cider, (in casks,).....gallons...	161,166	
Beer, ale, porter, and cider, (in bottles,).....dozen...	18,798	
Vinegar.....	.....	3,745
Spirits from molasses.....gallons...	463,760	183,446
Molasses.....	.....	3,438
Sugar, brown.....pounds...	387,203	28,722
Sugar, refined.....pounds...	4,782,723	521,117
Tobacco.....hogsheads...	78,995	9,832,943
Tobacco, manufactured.....pounds...	4,214,943	616,212
Snuff.....pounds...	42,467	

STATEMENT—Concluded.

ARTICLES.	Number and quantities.	Valuation.
Wood and its products—		
Staves and heading.....thousand...	51,182	
Shingles.....thousand...	37,569	$2,270,603
Boards, plank, and scantling.....M. feet...	84,630	
Hewn timber.....tons...	20,899	
Other lumber		327,687
Masts and spars		37,122
Oak-bark and other dye		309,696
Ashes, pot and pearl.....tons...	6,052	620,369
Tar and pitch.....barrels...	61,584	688,800
Rosin and turpentine.....barrels...	197,267	

Summary statement of the estimated quantities and valuation of the principal exports of the growth, produce, and manufacture of the United States, during the fiscal year, ending September 30, 1840. [Condensed from the Annual Report on Commerce and Navigation.]

ARTICLES.	Number and quantities.	Valuation.
Animals and their products—		
Hogs.....number...	4,854	
Pork.....barrels...	66,281	$1,894,894
Bacon and hams.....pounds...	1,643,397	
Lard.....pounds...	7,418,847	
Horned cattle.....number...	4,259	
Beef.....barrels...	19,681	623,373
Tallow.....pounds...	273,946	
Hides.....number...	112,500	
Butter.....pounds...	1,177,639	210,749
Cheese.....pounds...	723,217	
Tallow candles.....pounds...	1,710,454	451,995
Soap.....pounds...	3,335,641	
Horses.....number...	2,759	246,320
Mules.....number...	872	
Leather and morocco skins		19,557
Leather.....pounds...	534,187	
Boots.....pairs...	13,342	214,360
Shoes.....pairs...	63,380	
Sheep.....number...	14,558	30,698
Skins and furs		1,237,789
Wax.....pounds...	207,623	59,685
Apples.....barrels...	23,396	55,131
Bread stuffs—		
Indian corn.....bushels...	574,279	338,333
Indian meal.....barrels...	206,063	705,183
Wheat.....bushels...	1,720,860	1,635,483
Flour.....barrels...	1,897,501	10,143,615
Rye meal.....barrels...	53,218	170,931
Rye, oats, &c.		113,393
Rice.....tierces...	101,660	1,942,076
Biscuit, or ship-bread.....barrels...	106,276	428,988
Biscuit, or ship-bread.....kegs...	40,767	
Potatoes.....bushels...	123,549	54,524
Cables and cordage.....cwt....	3,552	43,510
Cotton—		
Sea Island.....pounds...	8,779,669	63,870,307
Other kinds.....pounds...	735,161,392	

STATEMENT—Concluded.

ARTICLES.	Number and quantities.	Valuation.
Cotton, piece goods—		
Printed and colored		$398,977
White		2,925,257
Nankeen		1,200
Twist, yarn, and thread		31,445
All other manufactures		192,728
Flaxseed ..... bushels	76,970	120,000
Flax and hemp—		
Cloth and thread		7,114
Bags and all other manufactures		1,128
Ginseng ..... pounds	46,581	22,728
Hops ..... pounds	82,086	11,235
Indigo ..... pounds	209	209
Linseed oil ..... gallons	3,968	63,348
Spirits of turpentine ..... gallons	162,309	
Salt ..... bushels	92,145	42,246
Spirits from grain ..... gallons	192,327	128,330
Beer, ale, porter, and cider, (in casks,) ..... gallons	105,159	
Beer, ale, porter, and cider, (in bottles,) ..... dozen	12,613	
Vinegar		6,401
Spirits from molasses ..... gallons	832,210	283,707
Molasses		9,775
Sugar, brown ..... pounds	769,908	45,940
Sugar, refined ..... pounds	10,741,648	1,214,658
Tobacco ..... hogsheads	119,484	9,883,957
Tobacco, manufactured ..... pounds	6,787,165	813,671
Snuff ..... pounds	37,132	
Wood, and its products—		
Staves and heading ..... thousand	28,136	1,801,049
Shingles ..... thousand	31,359	
Boards, plank, and scantling ..... M. feet	83,075	
Hewn timber ..... tons	12,484	
Other lumber		270,933
Masts and spars		29,049
Oak-bark and other dye		229,510
Ashes, pot and pearl ..... tons	5,572	533,193
Tar and pitch ..... barrels	44,655	602,529
Rosin and turpentine ..... barrels	215,121	

Summary statement of the estimated quantities and valuation of the principal exports of the growth, produce, and manufacture of the United States, during the fiscal year, ending September 30, 1841.
[Condensed from the Annual Report on Commerce and Navigation.]

ARTICLES.	Number and quantities.	Valuation.
Animals and their products—		
Hogs ..... number	7,901	$2,621,537
Pork ..... barrels	133,290	
Bacon and hams ..... pounds	2,794,517	
Lard ..... pounds	10,597,654	
Horned cattle ..... number	7,861	904,918
Beef ..... barrels	56,537	
Tallow ..... pounds	980,027	
Hides ..... number	45,898	

STATEMENT—Continued.

ARTICLES.	Number and quantities.	Valuation.
Butter.....pounds...	$3,785,993	$504,815
Cheese.....pounds...	1,748,471	
Tallow candles.....pounds...	2,145,845	494,577
Soap.....pounds...	3,414,122	
Horses.....number...	2,930	293,143
Mules.....number...	1,418	
Leather and morocco skins.....	.....	38,689
Leather.....pounds...	390,655	
Boots.....pairs...	14,619	193,583
Shoes.....pairs...	83,853	
Sheep.....number...	14,639	35,767
Skins and furs.....	.....	993,262
Wax.....pounds...	254,088	74,120
Apples.....barrels...	25,216	48,396
Bread stuffs—		
Indian corn.....bushels...	535,727	312,954
Indian meal.....barrels...	232,284	682,457
Wheat.....bushels...	868,585	882,881
Flour.....barrels...	1,515,817	7,759,646
Rye meal.....barrels...	44,031	138,505
Rye, oats, &c.....	.....	159,893
Rice.....tierces...	101,617	2,010,107
Biscuit, or ship-bread.....barrels...	103,995	378,041
Biscuit, or ship-bread.....kegs...	39,410	
Potatoes.....bushels...	136,095	64,402
Cables and cordage.....cwt...	2,805	31,582
Cotton—		
Sea Island.....pounds...	6,237,424	54,330,341
Other kinds.....pounds...	523,966,676	
Cotton, piece goods—		
Printed and colored.....	.....	450,503
White.....	.....	2,324,839
Twist, yarn, and thread.....	.....	43,503
All other manufactures.....	.....	303,701
Flaxseed.....bushels...	32,243	50,781
Flax and hemp—		
Cloth and thread.....	.....	2,764
Bags and all other manufactures.....	.....	10,636
Ginseng.....pounds...	640,967	437,245
Hops.....pounds...	176,619	28,823
Linseed oil.....gallons...	10,072	52,162
Spirits of turpentine.....gallons...	107,640	
Salt.....bushels...	215,084	62,765
Spirits from grain.....gallons...	328,791	97,150
Beer, ale, porter, and cider (in casks).....gallons...	106,017	59,133
Beer, ale, porter, and cider (in bottles).....dozen...	19,763	
Vinegar.....	.....	12,957
Spirits from molasses.....gallons...	1,281,142	371,294
Molasses.....	.....	7,999
Sugar, brown.....pounds...	312,864	23,837
Sugar, refined.....pounds...	13,435,084	1,348,974
Tobacco.....hogsheads...	147,828	12,576,703
Tobacco, manufactured.....pounds...	7,503,644	873,877
Snuff.....pounds...	68,553	
Wood and its products—		
Staves and heading.....thousand...	42,507	
Shingles.....thousand...	37,759	
Boards, plank, and scantling.....M. feet...	93,049	2,549,812
Hewn timber.....tons...	61,249	
Other lumber.....	.....	266,175
Masts and spars.....	.....	58,991
Oak-bark and other dye.....	.....	153,519

STATEMENT—Concluded.

ARTICLES.	Number and quantities.	Valuation.
Ashes, pot and pearl.....tons...	5,565	$573,026
Tar and pitch.....barrels...	77,019	684,514
Rosin and turpentine.....barrels...	244,846	

Summary statement of the estimated quantities and valuation of the principal exports of the growth, produce, and manufacture of the United States, during the fiscal year, ending September 30, 1842. [Condensed from the Annual Report on Commerce and Navigation.]

ARTICLES.	Number and quantities.	Valuation.
Animals, and their products—		
Hogs.....number...	5,564	
Pork.....barrels...	180,032	$2,629,403
Bacon and hams.....pounds...	2,518,841	
Lard.....pounds...	20,102,397	
Horned cattle.....number...	9,887	
Beef.....barrels...	48,581	1,212,638
Tallow.....pounds...	7,038,092	
Hides.....number...	58,187	
Butter.....pounds...	2,055,133	388,185
Cheese.....pounds...	2,456,607	
Tallow candles.....pounds...	1,981,602	485,128
Soap.....pounds...	3,854,836	
Horses.....number...	2,964	299,654
Mules.....number...	1,503	
Leather and morocco skins.....	.....	22,502
Leather.....pounds...	363,693	
Boots.....pairs...	4,615	168,925
Shoes.....pairs...	89,525	
Sheep.....number...	19,557	38,892
Skins and furs.....	.....	598,487
Wax.....pounds...	331,856	103,626
Apples.....barrels...	14,239	32,245
Bread stuffs—		
Indian corn.....bushels...	600,308	345,150
Indian meal.....barrels...	209,199	617,817
Wheat.....bushels...	817,958	916,616
Flour.....barrels...	1,283,602	7,375,356
Rye meal.....barrels...	34,190	124,396
Rye, oats, &c.....	.....	175,082
Rice.....tierces...	114,617	1,907,387
Biscuit, or ship-bread.....barrels...	83,594	323,759
Biscuit, or ship-bread.....kegs...	29,773	
Potatoes.....bushels...	194,946	85,844
Cables and cordage.....cwt...	2,589	30,457
Cotton—		
Sea Island.....pounds...	7,254,099	47,593,464
Other kinds.....pounds...	577,462,918	
Cotton, piece goods—		
Printed and colored.....	.....	385,040
White.....	.....	2,297,964
Twist, yarn, and thread.....	.....	37,325
All other manufactures.....	.....	250,361

STATEMENT—Concluded.

ARTICLES.	Number and quantities.	Valuation.
Flaxseed.....bushels...	18,354	$34,991
Flax and hemp—		
Bags, and all other manufactures.....	.....	1,038
Ginseng.....pounds...	144,426	63,702
Hops.....pounds...	339,181	36,547
Indigo.....pounds...	2,200	1,042
Linseed oil.....gallons...	4,367	34,775
Spirits of turpentine.....gallons...	74,193	
Salt.....bushels...	110,400	39,064
Spirits from grain.....gallons...	193,860	50,708
Beer, ale, porter, and cider (in casks).....gallons...	70,626	54,674
Beer, ale, porter, and cider (in bottles).....dozen...	19,102	
Vinegar.....	.....	10,208
Spirits from molasses.....gallons...	998,409	247,745
Molasses.....	.....	19,040
Sugar, brown.....pounds...	166,533	8,890
Sugar, refined.....pounds...	3,430,346	291,499
Tobacco.....hogsheads...	158,710	9,540,755
Tobacco manufactured.....pounds...	4,434,214	525,490
Snuff.....pounds...	42,668	
Wood and its products—		
Staves and heading.....thousand...	31,843	2,203,537
Shingles.....thousand...	34,050	
Boards, plank, and scantling.....M. feet...	162,639	
Hewn timber.....tons...	13,633	
Other lumber.....	.....	253,931
Masts and spars.....	.....	37,730
Oak-bark, and other dye.....	.....	111,087
Ashes, pot and pearl.....tons...	8,012	882,741
Tar and pitch.....barrels...	52,455	743,329
Rosin and turpentine.....barrels...	277,787	

Summary statement of the estimated quantities and valuation of the principal exports of the growth, produce, and manufacture of the United States, from the 1*st of October*, 1842, *to the* 30*th of June*, 1843.
[Condensed from the Annual Report on Commerce and Navigation.]

ARTICLES.	Number and quantities.	Valuation.
Animals and their products—		
Hogs.....number...	7,162	$2,120,029
Pork.....barrels...	80,310	
Bacon and hams.....pounds...	2,422,067	
Lard.....pounds...	24,534,217	
Horned cattle.....number...	5,181	1,092,949
Beef.....barrels...	37,812	
Tallow.....pounds...	7,489,582	
Hides.....number...	50,340	
Butter.....pounds...	3,408,247	508,968
Cheese.....pounds...	3,440,144	
Tallow candles.....pounds...	1,998,357	407,105
Soap.....pounds...	3,186,652	
Horses.....number...	2,002	212,696
Mules.....number...	1,193	
Leather and morocco skins.....	.....	58,782

STATEMENT—Concluded.

ARTICLES.	Number and quantities.	Valuation.
Leather.....pounds...	317,560	
Boots.....pairs...	3,646	$115,355
Shoes.....pairs...	65,499	
Sheep.....number...	13,609	29,061
Skins and furs.....	.....	453,869
Wax.....pounds...	475,727	137,532
Apples.....barrels...	15,412	32,825
Bread stuffs—		
Indian corn.....bushels...	672,608	281,749
Indian meal.....barrels...	174,354	454,166
Wheat.....bushels...	311,685	264,109
Flour.....barrels...	841,474	3,763,073
Rye meal.....barrels...	21,770	65,631
Rye, oats, &c.....	.....	108,640
Rice.....tierces...	106,766	1,625,726
Biscuit, or ship-bread.....barrels...	96,572	312,232
Biscuit, or ship-bread.....kegs...	29,351	
Potatoes.....bushels...	144,991	47,757
Cables and cordage.....cwt....	2,204	22,198
Cotton		
Sea Island.....pounds...	7,515,079	49,119,806
Other kinds.....pounds...	784,782,027	
Cotton, piece goods—		
Printed and colored.....	.....	358,415
White.....	.....	2,575,049
Twist, yarn, and thread.....	.....	57,312
All other manufactures.....	.....	232,774
Flaxseed.....bushels...	35,002	49,406
Flax and hemp—		
Bags, and all other manufactures.....	.....	326
Ginseng.....pounds...	556,533	193,870
Hops.....pounds...	1,182,565	123,745
Indigo.....pounds...	208	198
Linseed oil.....gallons...	4,185	29,434
Spirits of turpentine.....gallons...	61,053	
Salt.....bushels...	40,678	10,262
Spirits from grain.....gallons...	89,546	21,395
Beer, ale, porter, and cider, (in casks,).....gallons...	88,433	44,064
Beer, ale, porter, and cider, (in bottles,).....dozen...	14,182	
Vinegar.....	.....	7,555
Spirits from molasses.....gallons...	491,947	117,537
Molasses.....	.....	1,317
Sugar, brown.....pounds...	68,563	3,435
Sugar, refined.....pounds...	598,884	47,345
Tobacco.....hogsheads...	94,454	4,650,979
Tobacco, manufactured.....pounds...	3,404,252	278,319
Snuff.....pounds...	20,455	
Wood, and its products—		
Staves and heading.....thousand...	19,765	
Shingles.....thousand...	20,270	
Boards, plank and scantling.....M. feet...	49,754	1,026,179
Hewn timber.....tons...	1,230	
Other lumber.....	.....	211,111
Masts and spars.....	.....	19,669
Oak bark, and other dye.....	.....	39,538
Ashes, pot and pearl.....tons...	5,436	541,004
Tar and pitch.....barrels...	37,454	475,357
Rosin and turpentine.....barrels...	188,952	

Summary statement of the estimated quantities and valuation of the principal exports of the growth, produce, and manufacture of the United States, during the fiscal year, ending June 30th, 1844.
[Condensed from the Annual Report on Commerce and Navigation.]

ARTICLES.	Number and quantities.	Valuation.
Animals and their products—		
Hogs.....number...	9,615	
Pork.....barrels...	161,629	$3,236,479
Bacon and hams.....pounds...	3,886,976	
Lard.....pounds...	25,746,355	
Horned cattle.....number...	10,822	
Beef.....barrels...	106,474	1,810,551
Tallow.....pounds...	9,915,366	
Hides.....number...	62,658	
Butter.....pounds...	3,251,952	758,829
Cheese.....pounds...	7,343,145	
Tallow candles.....pounds...	3,086,566	619,544
Soap.....pounds...	4,732,751	
Horses.....number...	3,135	315,696
Mules.....number...	2,019	
Leather and morocco skins.....	.....	39,197
Leather.....pounds...	591,951	
Boots.....pairs...	10,409	204,000
Shoes.....pairs...	95,532	
Sheep.....number...	12,980	27,824
Skins and furs.....	.....	742,196
Wax.....pounds...	963,031	278,039
Apples.....barrels...	22,324	51,465
Bread stuffs—		
Indian corn.....bushels...	825,282	404,008
Indian meal.....barrels...	247,882	641,029
Wheat.....bushels...	558,917	500,400
Flour.....barrels...	1,438,574	6,759,488
Rye meal.....barrels...	32,690	104,391
Rye, oats, &c.....	.....	133,477
Rice.....tierces...	134,715	2,182,468
Biscuit, or ship-bread.....barrels...	117,781	388,603
Biscuit, or ship-bread.....kegs...	41,920	
Potatoes.....bushels...	182,238	74,108
Cables and cordage.....cwt...	5,078	49,242
Cotton—		
Sea Island.....pounds...	6,099,076	54,063,501
Other kinds.....pounds...	657,534,379	
Cotton, piece goods—		
Printed and colored.....	.....	385,403
White.....	.....	2,298,800
Twist, yarn, and thread.....	.....	44,421
All other manufactures.....	.....	179,156
Flaxseed.....bushels...	15,206	23,749
Flax and hemp—		
Bags and all other manufactures.....	.....	311
Ginseng.....pounds...	301,408	95,008
Hops.....pounds...	664,363	51,550
Indigo.....pounds...	2,500	1,176
Linseed oil.....gallons...	6,327	68,476
Spirits of turpentine.....gallons...	156,203	
Salt.....bushels...	157,529	47,755
Spirits from grain.....gallons...	215,719	56,697
Beer, ale, porter, and cider, (in casks,).....gallons...	113,029	59,312
Beer, ale, porter, and cider, (in bottles,).....dozen...	18,990	
Vinegar.....	.....	8,315
Spirits from molasses.....gallons...	881,325	241,604

STATEMENT—Concluded.

ARTICLES.	Number and quantities.	Valuation.
Molasses		$3,922
Sugar, brown ..... pounds...	187,118	12,363
Sugar, refined ..... pounds...	1,671,107	128,594
Tobacco ..... hogsheads...	163,042	8,397,255
Tobacco, manufactured ..... pounds...	6,046,878	536,600
Snuff ..... pounds...	28,668	
Wood and its products—		
Staves and heading ..... thousand...	23,246	
Shingles ..... thousand...	42,615	
Boards, plank, and scantling ..... M. feet...	92,179	1,672,279
Hewn timber ..... tons...	4,700	
Other lumber		326,945
Masts and spars		23,274
Oak-bark and other dye		70,370
Ashes, pot and pearl ..... tons...	18,271	1,140,848
Tar and pitch ..... barrels...	62,477	818,692
Rosin and turpentine ..... barrels...	362,668	

Summary statement of the estimated quantities and valuation of the principal exports of the growth, produce, and manufacture of the United States, during the fiscal year, ending June 30, 1845.
[Condensed from the Annual Report on Commerce and Navigation.]

ARTICLES.	Number and quantities.	Valuation.
Animals, and their products—		
Hogs ..... number...	6,384	
Pork ..... barrels...	161,609	
Bacon and hams ..... pounds...	2,719,360	$2,991,284
Lard ..... pounds...	20,060,993	
Horned cattle ..... number...	5,252	
Beef ..... barrels...	101,538	
Tallow ..... pounds...	10,022,504	1,926,809
Hides ..... number...	111,636	
Butter ..... pounds...	3,587,489	
Cheese ..... pounds...	7,941,187	878,865
Tallow candles ..... pounds...	3,490,736	
Soap ..... pounds...	4,138,313	623,946
Horses ..... number...	3,052	
Mules ..... number...	3,248	385,488
Leather and morocco skins		16,363
Leather ..... pounds...	1,122,902	
Boots ..... pairs...	7,738	
Shoes ..... pairs...	128,828	328,091
Sheep ..... number...	6,464	23,948
Skins and furs		1,248,355
Wax ..... pounds...	814,499	234,794
Apples ..... barrels...	54,022	81,306
Bread stuffs—		
Indian corn ..... bushels...	840,184	411,741
Indian meal ..... barrels...	269,030	641,552
Wheat ..... bushels...	389,716	336,779
Flour ..... barrels...	1,195,230	5,398,593
Rye meal ..... barrels...	35,371	112,908
Rye, oats, &c		177,953
Rice ..... tierces...	118,621	2,160,456

STATEMENT—Concluded.

ARTICLES.	Number and quantities.	Valuation.
Biscuit, or ship-bread.....barrels...	117,529	$366,294
Biscuit, or ship-bread.....kegs...	30,183	
Potatoes.....bushels...	274,216	122,926
Cables and cordage.....cwt...	5,654	55,016
Cotton—		
Sea Island.....pounds...	9,389,625	51,739,643
Other kinds.....pounds...	863,516,371	
Cotton, piece goods—		
Printed and colored.....	.....	516,243
White.....	.....	2,343,104
Nankeen.....	.....	1,174,038
Twist, yarn, and thread.....	.....	14,379
All other manufactures.....	.....	280,164
Flaxseed.....bushels...	178,007	81,978
Flax and hemp—		
Cloth and thread.....	.....	950
Bags, and all other manufactures.....	.....	13,812
Ginseng.....pounds...	468,530	177,146
Hops.....pounds...	902,072	90,341
Indigo.....pounds...	100	70
Linseed oil.....gallons...	7,416	92,614
Spirits of turpentine.....gallons...	182,989	
Salt.....bushels...	131,500	45,151
Spirits from grain.....gallons...	277,514	75,108
Beer, ale, porter, and cider (in casks).....gallons...	185,033	69,582
Beer, ale, porter, and cider (in bottles).....dozen...	21,226	
Vinegar.....	.....	14,375
Spirits from molasses.....gallons...	710,612	216,118
Molasses.....	.....	20,771
Sugar, brown.....pounds...	195,985	11,107
Sugar, refined.....pounds...	1,997,992	164,662
Tobacco.....hogsheads...	147,168	7,469,819
Tobacco, manufactured.....pounds...	5,312,971	538,498
Snuff.....pounds...	44,399	
Wood and its products—		
Staves and heading.....thousand...	21,264	1,953,222
Shingles.....thousand...	60,918	
Boards, plank, and scantling.....M.feet...	96,673	
Hewn timber.....tons...	4,590	
Other lumber.....	.....	369,505
Masts and spars.....	.....	28,692
Oak bark and other dye.....	.....	70,616
Ashes, pot and pearl.....tons...	24,219	1,210,496
Tar and pitch.....barrels...	58,002	814,969
Rosin and turpentine.....barrels...	347,683	

Summary statement of the estimated quantities and valuation of the principal exports of the growth, produce, and manufacture of the United States, during the fiscal year, ending the 30th of June, 1846.
[Condensed from the Annual Report on Commerce and Navigation.]

ARTICLES.	Number and quantities.	Valuation.
Animals and their products—		
Hogs.....number...	7,437	$3,883,884
Pork.....barrels...	190,422	
Bacon and hams.....pounds...	3,006,630	
Lard.....pounds...	21,843,164	

STATEMENT—Continued.

ARTICLES.	Number and quantities.	Valuation.
Horned cattle.....number...	3,101	
Beef.....barrels...	149,223	$2,474,208
Tallow.....pounds...	10,435,696	
Hides.....number...	143,323	
Butter.....pounds...	3,436,660	
Cheese.....pounds...	8,675,390	1,063,087
Tallow candles.....pounds...	3,718,714	
Soap.....pounds...	3,161,910	630,041
Horses.....number...	3,082	
Mules.....number...	3,020	382,382
Leather and morocco skins.....	.....	26,667
Leather.....pounds...	1,326,251	
Boots.....pairs...	17,183	
Shoes.....pairs...	121,139	346,516
Sheep.....number...	9,254	30,303
Wool.....pounds...	668,386	203,996
Skins and furs.....	.....	1,063,009
Wax.....pounds...	542,250	162,790
Apples.....barrels...	30,903	69,253
Bread stuffs—		
Indian corn.....bushels...	1,826,068	1,186,663
Indian meal.....barrels...	298,790	945,081
Wheat.....bushels...	1,613,795	1,681,975
Flour.....barrels...	2,289,476	11,668,669
Rye meal.....barrels...	38,530	138,110
Rye, oats, &c.....	.....	638,221
Rice.....tierces...	124,007	2,564,991
Biscuit, or ship bread.....barrels...	114,792	
Biscuit, or ship bread.....kegs...	25,505	366,688
Potatoes.....bushels...	125,150	69,934
Cables and cordage.....cwt...	5,860	62,775
Cotton—		
Sea Island.....pounds...	9,388,533	
Other kinds.....pounds...	538,169,522	42,767,341
Cotton, piece goods—		
Printed and colored.....	.....	380,549
White.....	.....	1,978,331
Nankeen.....	.....	848,989
Twist, yarn, and thread.....	.....	81,813
All other manufactures.....	.....	255,799
Flaxseed.....bushels...	107,959	165,438
Flax and hemp—		
Cloth and thread.....	.....	1,364
Bags, and all other manufactures.....		10,765
Ginseng.....pounds...	567,297	237,562
Hops.....pounds...	287,754	41,692
Indigo.....pounds...	90	90
Linseed oil.....gallons...	8,656	
Spirits of turpentine.....gallons...	329,570	159,915
Salt.....bushels...	117,627	30,520
Spirits from grain.....gallons...	257,496	73,716
Beer, ale, porter, and cider, (in casks,).....gallons...	195,662	
Beer, ale, porter, and cider, (in bottles,).....dozen...	17,350	67,735
Vinegar.....	.....	17,489
Spirits from molasses.....gallons...	850,462	268,652
Molasses.....	.....	1,581
Sugar, brown.....pounds...	109,295	7,235
Sugar, refined.....pounds...	4,128,512	392,312
Tobacco.....hogsheads...	147,998	8,478,270
Tobacco, manufactured.....pounds...	6,854,856	
Snuff.....pounds...	52,458	695,914

STATEMENT—Concluded.

ARTICLES.	Number and quantities.	Valuation.
Wood, and its products—		
Staves and heading.....thousand...	28,800	$2,319,443
Shingles.....thousand...	42,093	
Boards, plank, and scantling.....M. feet...	100,119	
Hewn timber.....tons...	6,779	
Other lumber.....	.....	324,979
Masts and spars.....	.....	21,682
Oak-bark and other dye.....	.....	61,382
Ashes, pot and pearl.....tons...	9,800	735,689
Tar and pitch.....barrels...	65,805	1,085,712
Rosin and turpentine.....barrels...	351,914	

Summary statement of the estimated quantities and valuation of the principal exports of the growth, produce, and manufacture of the United States, during the fiscal year, ending the 30th of June, 1847.
[Condensed from the Annual Report on Commerce and Navigation.]

ARTICLES.	Number and quantities.	Valuation.
Animals and their products—		
Hogs.....number...	3,274	$6,630,842
Pork.....barrels...	206,190	
Bacon and hams.....pounds...	17,921,471	
Lard.....pounds...	37,611,161	
Horned cattle.....number...	3,383	2,434,063
Beef.....barrels...	111,979	
Tallow.....pounds...	11,172,975	
Hides.....number...	181,394	
Butter.....pounds...	4,214,433	1,741,770
Cheese.....pounds...	15,637,600	
Tallow candles.....pounds...	3,094,985	606,798
Soap.....pounds...	3,802,783	
Horses.....number...	2,077	277,359
Mules.....number...	2,341	
Leather and morocco skins.....	.....	29,856
Leather.....pounds...	969,803	243,816
Boots.....pairs...	5,883	
Shoes.....pairs...	87,257	
Sheep.....number...	10,533	29,100
Wool.....pounds...	378,440	89,460
Skins and furs.....	.....	747,145
Wax.....pounds...	627,013	161,527
Apples.....barrels...	45,300	92,961
Bread stuffs—		
Indian corn.....bushels...	16,326,050	14,395,212
Indian meal.....barrels...	948,060	4,301,334
Wheat.....bushels...	4,399,951	6,049,350
Flour.....barrels...	4,382,496	26,133,811
Rye meal.....barrels...	48,892	225,502
Rye, oats, &c.....	.....	1,600,962
Rice.....tierces...	144,427	3,605,896
Biscuit, or ship bread.....barrels...	160,980	556,266
Biscuit, or ship bread.....kegs...	31,082	
Potatoes.....bushels...	164,365	109,062
Cables and cordage.....cwt...	3,302	27,054
Cotton—		
Sea Island.....pounds...	6,293,973	53,415,848
Other kinds.....pounds...	520,925,985	

STATEMENT—Concluded.

ARTICLES.	Number and quantities.	Valuation.
Cotton, piece goods—		
Printed and colored		$281,320
White		3,345,902
Nankeen		8,794
Twist, yarn, and thread		108,132
All other manufactures		338,375
Flaxseed ..... bushels...	968	1,346
Flax and hemp—		
Cloth and thread		477
Bags and all other manufactures		5,305
Ginseng ..... pounds...	139,906	64,466
Hops ..... pounds...	1,227,453	150,654
Indigo ..... pounds...	25	10
Linseed oil ..... gallons...	6,701	498,110
Spirits of turpentine ..... gallons...	1,093,464	
Salt ..... bushels...	202,244	42,333
Spirits from grain ..... gallons...	202,547	67,781
Beer, ale, porter, and cider, (in casks,) ..... gallons...	215,025	68,114
Beer, ale, porter, and cider, (in bottles,) ..... dozen...	14,575	
Vinegar		9,526
Spirits from molasses ..... gallons...	859,732	293,609
Molasses		26,959
Sugar, brown ..... pounds...	388,057	25,483
Sugar, refined ..... pounds...	1,539,415	124,824
Tobacco ..... hogsheads...	135,762	7,242,086
Tobacco, manufactured ..... pounds...	7,844,592	658,950
Snuff ..... pounds...	37,051	
Wood and its products—		
Staves and heading ..... thousand...	21,206	1,849,911
Shingles ..... thousand...	38,147	
Boards, plank, and scantling ..... M. feet...	90,481	
Hewn timber ..... tons...	9,714	
Other lumber		342,781
Masts and spars		23,720
Oak-bark and other dye		95,355
Ashes, pot and pearl ..... tons...	7,235	618,000
Tar and pitch ..... barrels...	47,245	759,221
Rosin and turpentine ..... barrels...	312,059	

Summary statement of the estimated quantities and valuation of the principal exports of the growth, produce, and manufacture of the United States, during the fiscal year, ending the 30th of June, 1848.
[Condensed from the Annual Report on Commerce and Navigation.]

ARTICLES.	Number and quantities.	Valuation.
Animals, and their products—		
Hogs ..... number...	4,750	$9,003,272
Pork ..... barrels...	248,269	
Bacon and hams ..... pounds...	33,551,034	
Lard ..... pounds...	49,625,539	
Horned cattle ..... number...	1,919	1,905,341
Beef ..... barrels...	103,719	
Tallow ..... pounds...	8,004,235	
Hides ..... number...	36,145	

STATEMENT—Continued.

ARTICLES.	Number and quantities.	Valuation.
Butter.....pounds...	2,751,086	$1,361,668
Cheese.....pounds...	12,913,305	
Tallow candles.....pounds...	3,468,593	670,223
Soap.....pounds...	3,644,031	
Horses.....number...	996	190,295
Mules.....number...	1,625	
Leather and morocco skins.....	.....	16,483
Leather.....pounds...	497,102	194,095
Boots.....pairs...	6,553	
Shoes.....pairs...	130,242	
Sheep.....number...	6,231	20,823
Wool.....pounds...	781,102	57,497
Skins and furs.....	.....	607,780
Wax.....pounds...	529,691	134,577
Apples.....barrels...	38,719	88,944
Bread stuffs—		
Indian corn.....bushels...	5,817,634	3,837,483
Indian meal.....barrels...	582,339	1,807,601
Wheat.....bushels...	2,034,704	2,669,175
Flour.....barrels...	2,119,393	13,194,109
Rye meal.....barrels...	41,584	174,566
Rye, oats, &c.....	.....	376,572
Rice.....tierces...	100,403	2,331,824
Biscuit, or ship-bread.....barrels...	167,790	619,096
Biscuit, or ship-bread.....kegs...	38,121	
Potatoes.....bushels...	133,170	86,277
Cables and cordage.....cwt...	2,326	29,911
Coal.....tons...	9,309	47,112
Cotton—		
Sea Island.....pounds...	7,724,148	61,998,294
Other kinds.....pounds...	806,550,283	
Cotton, piece goods—		
Printed and colored.....	.....	351,169
White.....	.....	4,866,559
Nankeen.....	.....	2,365
Twist, yarn, and thread.....	.....	170,633
All other manufactures.....	.....	327,479
Flaxseed.....bushels...	1,017	1,584
Flax and hemp—		
Hemp.....cwt...	5,085	27,657
Cloth and thread.....	.....	495
Bags and all other manufactures.....	.....	6,218
Ginseng.....pounds...	465,460	162,647
Hops.....pounds...	257,016	17,671
Ice.....	.....	75,547
Indigo.....pounds...	1,150	1,100
Linseed oil.....gallons...	11,066	331,404
Spirits of turpentine.....gallons...	729,500	
Salt.....bushels...	219,145	73,274
Spirits from grain.....gallons...	242,579	90,957
Beer, ale, porter, and cider, (in casks,).....gallons...	254,607	78,071
Beer, ale, porter, and cider, (in bottles,).....dozen...	20,389	
Vinegar.....	.....	13,920
Spirits from molasses.....gallons...	805,701	269,467
Molasses.....	.....	5,563
Sugar, brown.....pounds...	135,006	8,891
Sugar, refined.....pounds...	3,378,773	253,900
Tobacco.....hogsheads...	130,665	7,551,122
Tobacco, manufactured.....pounds...	6,698,507	568,435
Snuff.....pounds...	36,122	

STATEMENT—Concluded.

ARTICLES.	Number and quantities.	Valuation.
Wood, and its products—		
Staves and heading.....thousand...	22,463	
Shingles.....thousand...	39,743	
Boards, plank, and scantling.....M. feet...	100,590	$2,429,863
Hewn timber.....tons...	21,033	
Other lumber.....	.....	283,433
Masts and spars.....	.....	129,760
Oak-bark and other dye.....	.....	184,126
Ashes, pot and pearl.....tons...	4,465	466,477
Tar and pitch.....barrels...	60,340	752,303
Rosin and turpentine.....barrels...	324,738	

Summary statement of the estimated quantities and valuation of the principal exports of the growth, produce, and manufacture of the United States, during the fiscal year, ending the 30th of June, 1849.
[Condensed from the Annual Report on Commerce and Navigation.]

ARTICLES.	Number and quantities.	Valuation.
Animals and their products—		
Hogs.....number...	1,121	
Pork.....barrels...	253,486	
Bacon and hams.....pounds...	56,060,822	$9,245,885
Lard.....pounds...	37,446,761	
Horned cattle.....number...	2,607	
Beef.....barrels...	103,286	
Tallow.....pounds...	9,334,138	2,058,958
Hides.....number...	23,390	
Butter.....pounds...	3,406,242	
Cheese.....pounds...	17,433,682	1,654,157
Tallow candles.....pounds...	3,170,109	
Soap.....pounds...	3,959,770	627,280
Horses.....number...	896	
Mules.....number...	568	96,982
Leather and morocco skins.....	.....	9,427
Leather.....pounds...	314,894	
Boots.....pairs...	14,634	151,774
Shoes.....pairs...	98,662	
Sheep.....number...	4,195	16,305
Wool.....pounds...	159,925	81,015
Skins and furs.....	.....	656,228
Wax.....pounds...	538,056	121,720
Apples.....barrels...	47,694	93,904
Bread stuffs—		
Indian corn.....bushels...	13,257,309	7,966,369
Indian meal.....barrels...	405,169	1,169,625
Wheat.....bushels...	1,527,534	1,756,848
Flour.....barrels...	2,108,013	11,280,582
Rye meal.....barrels...	64,830	218,248
Rye, oats, &c.....	.....	139,793
Rice.....tierces...	128,861	2,569,362
Biscuit, or ship-bread.....barrels...	111,372	
Biscuit, or ship-bread.....kegs...	21,378	364,318
Potatoes.....bushels...	109,665	83,313
Cables and cordage.....cwt...	5,944	41,636
Coal.....tons...	9,661	40,396

STATEMENT—Concluded.

ARTICLES.	Number and quantities.	Valuation.
Cotton—		
Sea Island.....pounds...	11,969,259	$66,396,967
Other kinds.....pounds...	1,014,633,010	
Cotton, piece goods—		
Printed and colored.....	.....	466,574
White.....	.....	3,955,117
Nankeen.....	.....	3,203
Twist, yarn, and thread.....	.....	92,555
All other manufactures.....	.....	415,680
Flaxseed.....bushels...	4	4
Flax and hemp—		
Hemp.....cwt...	621	8,458
Cloth and thread.....	.....	1,009
Bags and all other manufactures.....	.....	4,549
Ginseng.....pounds...	584,021	182,966
Hops.....pounds...	411,164	29,123
Ice.....	.....	95,027
Indigo.....pounds...	493	49
Linseed oil.....gallons...	7,797	148,056
Spirits of turpentine.....gallons...	394,746	
Salt.....bushels...	312,063	82,972
Spirits from grain.....gallons...	222,375	67,129
Beer, ale, porter, and cider, (in casks,)..... gallons...	155,584	51,320
Beer, ale, porter, and cider, (in bottles,).....dozen...	13,496	
Vinegar.....	.....	14,036
Spirits from molasses.....gallons...	974,899	288,452
Molasses.....	.....	7,442
Sugar, brown..... .....pounds...	399,209	24,906
Sugar, refined..... pounds...	1,956,895	129,001
Tobacco..... hogsheads...	101,521	5,804,207
Tobacco, manufactured.....pounds...	7,159,397	613,044
Snuff.....pounds...	49,888	
Wood and its products—		
Staves and heading.....thousand...	22,618	1,776,749
Shingles.....thousand...	30,277	
Boards, plank, and scantling ..... M.feet...	67,346	
Hewn timber.....tons...	9,979	
Other lumber.....	.....	60,344
Masts and spars.....	.....	87,720
Oak-bark and other dye.....	.....	95,392
Ashes, pot and pearl.....tons...	4,603	515,603
Tar and pitch.....barrels...	79,125	845,164
Rosin and turpentine.....barrels...	325,694	

Summary statement of the estimated quantities and valuation of the principal exports of the growth, produce, and manufacture of the United States, during the fiscal year, ending the 30th of June, 1850.
[Condensed from the Annual Report on Commerce and Navigation.]

ARTICLES.	Number and quantities.	Valuation.
Animals and their products—		
Hogs.....number...	881	$7,550,287
Pork.....barrels...	188,841	
Bacon and hams.....pounds...	41,014,528	
Lard.....pounds...	54,925,546	

STATEMENT—Continued.

ARTICLES.	Number and quantities.	Valuation.
Horned cattle.....number...	1,848	
Beef.....barrels...	95,307	$1,605,608
Tallow.....pounds...	5,858,459	
Hides.....number...	71,940	
Butter.....pounds...	3,876,175	1,215,463
Cheese.....pounds...	13,020,817	
Tallow candles.....pounds...	3,587,884	664,963
Soap.....pounds...	4,402,542	
Horses.....number...	957	139,494
Mules.....number...	871	
Leather and morocco skins.....	.....	9,800
Leather.....pounds...	258,528	
Boots.....pairs...	18,521	193,598
Shoes.....pairs...	133,699	
Sheep.....number...	3,945	15,753
Wool.....pounds...	35,898	22,778
Skins and furs.....	.....	852,466
Wax.....pounds...	514,096	118,055
Apples.....barrels...	11,215	24,974
Bread stuffs—		
Indian corn.....bushels...	6,595,092	3,892,193
Indian meal.....barrels...	259,442	760,611
Wheat.....bushels...	608,661	643,745
Flour.....barrels...	1,385,448	7,098,570
Rye meal.....barrels...	69,903	216,076
Rye, oats, &c.....	.....	121,191
Rice.....tierces...	127,069	2,631,577
Biscuit, or ship-bread.....barrels...	97,561	334,123
Biscuit, or ship-bread.....kegs...	26,368	
Potatoes.....bushels...	155,595	99,333
Cables and cordage.....cwt...	4,177	51,357
Coal.....tons...	38,741	167,090
Cotton—		
Sea Island.....pounds...	8,236,463	71,984,616
Other kinds.....pounds...	627,145,141	
Cotton, piece goods—		
Printed and colored.....	.....	606,631
White.....	.....	3,774,407
Twist, yarn, and thread.....	.....	17,405
All other manufactures.....	.....	335,981
Flaxseed.....bushels...	2,501	4,040
Flax and hemp—		
Hemp.....cwt...	787	5,633
Cloth and thread.....	.....	1,183
Bags and all other manufactures.....	.....	10,593
Ginseng.....pounds...	367,448	122,916
Hops.....pounds...	1,275,455	142,692
Ice.....	.....	107,018
Linseed oil.....gallons...	13,488	229,741
Spirits of turpentine.....gallons...	644,616	
Salt.....bushels...	319,175	75,103
Spirits from grain.....gallons...	176,685	48,314
Beer, ale, porter, and cider, (in casks,).....gallons...	168,791	52,251
Beer, ale, porter, and cider, (in bottles,).....dozen...	11,282	
Vinegar.....	.....	11,182
Spirits from molasses.....gallons...	919,956	268,290
Molasses.....	.....	14,137
Sugar, brown.....pounds...	458,839	23,037
Sugar, refined.....pounds...	2,786,022	285,056
Tobacco.....hogsheads...	145,729	9,951,023
Tobacco, manufactured.....pounds...	5,918,583	648,832
Snuff.....pounds...	44,690	

STATEMENT—Concluded.

ARTICLES.	Number and quantities.	Valuation.
Wood, and its products—		
Staves and heading.....thousand...	32,459	$2,437,079
Shingles.....thousand...	32,779	
Boards, plank, and scantling.....M. feet...	74,743	
Hewn timber.....tons...	20,287	
Other lumber.....	.....	107,827
Masts and spars.....	.....	52,109
Oak-bark and other dye.....	.....	205,771
Ashes, pot and pearl.....tons...	4,593	572,870
Tar and pitch.....barrels...	133,833	1,142,713
Rosin and turpentine.....barrels...	398,111	

Summary statement of the estimated quantities and valuation of the principal exports of the growth, produce, and manufacture of the United States, during the fiscal year, ending the 30th of June, 1851.
[Condensed from the Annual Report on Commerce and Navigation.]

ARTICLES.	Number and quantities.	Valuation.
Animals, and their products—		
Hogs.....number...	1,030	$4,368,015
Pork.....barrels...	165,206	
Bacon and hams.....pounds...	18,027,302	
Lard.....pounds...	19,683,082	
Horned cattle.....number...	1,350	1,689,958
Beef.....barrels...	90,648	
Tallow.....pounds...	8,198,278	
Hides.....number...	86,624	
Butter.....pounds...	3,994,542	1,124,652
Cheese.....pounds...	10,361,189	
Tallow candles.....pounds...	3,227,633	609,732
Soap.....pounds...	4,288,378	
Horses.....number...	1,364	198,155
Mules.....number...	2,946	
Leather and morocco skins.....	.....	13,309
Leather.....pounds...	222,676	458,838
Boots.....pairs...	77,478	
Shoes.....pairs...	205,198	
Sheep.....number...	4,357	18,875
Skins and furs.....	.....	977,762
Wax.....pounds...	415,923	122,835
Apples.....barrels...	28,842	71,376
Bread stuffs—		
Indian corn.....bushels...	3,426,811	1,762,549
Indian meal.....barrels...	203,622	622,866
Wheat.....bushels...	1,026,725	1,025,732
Flour.....barrels...	2,202,335	10,524,331
Rye meal.....barrels...	44,152	145,802
Rye, oats, &c.....	.....	120,670
Rice.....tierces...	105,590	2,170,927
Biscuit, or ship-bread.....barrels...	106,399	254,286
Biscuit, or ship-bread.....kegs...	34,815	
Potatoes.....bushels...	106,342	79,314
Cables and Cordage.....cwt...	7,303	52,054
Coal.....tons...	37,727	163,977

STATEMENT—Concluded.

ARTICLES.	Number and quantities.	Valuation.
Cotton—		
Sea Island.....pounds...	8,299,656	$112,315,317
Other kinds.....pounds...	918,937,433	
Cotton, piece goods—		
Printed and colored.....	.....	1,006,561
White.....	.....	5,571,576
Twist, yarn, and thread.....	.....	37,260
All other manufactures.....	.....	625,808
Flaxseed.....bushels...	9,185	18,988
Flax and hemp—		
Hemp.....cwt...	4,769	29,114
Cloth and thread.....	.....	1,647
Bags and all other manufactures.....	.....	6,376
Ginseng.....pounds...	196,510	100,549
Hops.....pounds...	110,360	11,636
Ice.....	.....	106,805
Indigo.....pounds...	2,740	2,803
Linseed oil.....gallons...	20,193	145,410
Spirits of turpentine.....gallons...	368,828	
Salt.....bushels...	344,061	61,424
Spirits from grain.....gallons...	95,245	36,084
Beer, ale, porter, and cider (in casks).....gallons...	143,014	57,975
Beer, ale, porter, and cider (in bottles).....dozen...	15,122	
Vinegar.....	.....	16,915
Spirits from molasses.....gallons...	756,246	339,622
Molasses.....	.....	16,830
Sugar, brown.....pounds...	561,828	29,170
Sugar, refined.....pounds...	2,689,541	219,588
Tobacco.....hogsheads...	95,945	9,219,251
Tobacco, manufactured.....pounds...	7,235,358	1,143,547
Snuff.....pounds...	37,422	
Wood, and its products—		
Staves and heading.....thousand...	33,006	2,348,621
Shingles.....thousand...	34,871	
Boards, plank, and scantling.....M. feet...	100,604	
Hewn timber.....tons...	13,372	
Other lumber.....	.....	205,190
Masts and spars.....	.....	70,095
Oak-bark and other dye.....	.....	355,477
Ashes, pot and pearl.....tons...	5,918	649,091
Tar and pitch.....barrels...	112,971	1,063,842
Rosin and turpentine.....barrels...	387,220	

Summary statement of the estimated quantities and valuation of the principal exports of the growth, produce, and manufacture of the United States, during the fiscal year, ending the 30th of June, 1852.
[Condensed from the Annual Report on Commerce and Navigation.]

ARTICLES.	Number and quantities.	Valuation.
Animals and their products—		
Hogs.....number...	185	$3,765,470
Pork.....barrels..	83,382	
Bacon and hams.....pounds...	5,746,816	
Lard.....pounds...	21,281,951	

STATEMENT—Continued.

ARTICLES.	Number and quantities.	Valuation.
Horned cattle.....number...	1,078	
Beef.....barrels...	122,259	$1,500,429
Tallow.....pounds...	4,767,020	
Hides.....number...	55,421	
Butter.....pounds...	2,222,264	779,391
Cheese.....pounds...	6,650,420	
Tallow candles.....pounds...	3,612,002	660,054
Soap.....pounds...	4,233,481	
Horses.....number...	1,550	247,550
Mules.....number...	1,233	
Leather and morocco skins.....	.....	18,617
Leather.....pounds...	966,519	428,708
Boots and shoes.....pairs...	303,472	
Sheep.....number...	2,968	16,291
Wool.....pounds....	55,550	14,308
Skins and furs.....	.....	798,504
Wax.....pounds...	326,368	91,499
Apples.....barrels...	18,411	43,635
Bread stuffs—		
Indian corn.....bushels...	2,627,075	1,540,225
Indian meal.....barrels...	181,105	574,380
Wheat.....bushels...	2,694,540	2,555,209
Flour.....barrels...	2,799,339	11,869,143
Rye meal.....barrels...	18,524	64,476
Rye, oats, &c.....	.....	334,471
Rice.....tierces...	119,733	2,471,024
Biscuit, or ship-bread.....barrels...	93,694	318,899
Biscuit, or ship-bread.....kegs...	46,625	
Potatoes.....bushels...	148,916	115,121
Cables and cordage.....cwt...	13,220	62,903
Coal.....tons...	45,336	188,906
Cotton—		
Sea Island.....pounds...	11,738,075	87,657,732
Other kinds.....pounds...	1,081,492,564	
Cotton, piece goods—		
Printed and colored.....	.....	326,404
White.....	.....	6,139,391
Twist, yarn, and thread.....	.....	34,718
All other manufactures.....	.....	571,638
Flaxseed.....bushels...	31,304	56,187
Flax and hemp—		
Hemp.....cwt...	3,067	18,649
Cloth and thread.....	.....	5,468
Bags and all other manufactures.....	.....	8,154
Ginseng.....pounds...	158,455	102,073
Hops.....pounds...	238,008	69,042
Ice.....	.....	161,086
Indigo.....pounds...	1,079	910
Linseed oil.....gallons...	18,073	14,981
Spirits of turpentine.....gallons...	358,658	137,856
Salt.....bushels...	1,467,676	89,316
Spirits from grain.....gallons...	136,347	48,737
Beer, ale, porter, and cider, (in casks,).....gallons...	111,372	48,052
Beer, ale, porter, and cider, (in bottles,).....dozen...	13,058	
Vinegar.....	.....	12,220
Spirits from molasses.....gallons...	1,102,696	323,949
Molasses.....	.....	13,163
Sugar, brown.....pounds...	401,620	24,057
Sugar, refined.....pounds...	2,096,770	149,921
Tobacco.....hogsheads...	137,097	10,031,283
Tobacco, manufactured.....pounds...	8,436,153	1,317,622
Snuff.....pounds...	58,475	

STATEMENT—Concluded.

ARTICLES.	Number and quantities.	Valuation.
Wood and its products—		
Staves and heading ..... thousand...	29,106	$2,674,577
Shingles ..... thousand...	53,405	
Boards, plank, and scantling ..... M. feet...	100,695	
Hewn timber ..... tons...	24,409	
Other lumber	.....	123,522
Masts and spars	.....	95,459
Oak-bark and other dye	.....	160,154
Ashes, pot and pearl ..... tons...	5,052	507,673
Tar and pitch ..... barrels...	63,254	1,209,173
Rosin and turpentine ..... barrels...	449,194	

Summary statement of the estimated quantities and valuation of the principal exports of the growth, produce, and manufacture of the United States, during the fiscal year, ending the 30th of June, 1853.
[Condensed from the Annual Report on Commerce and Navigation.]

ARTICLES.	Number and quantities.	Valuation.
Animals and their products—		
Hogs ..... number...	22	$6,202,324
Pork ..... barrels...	129,881	
Bacon and hams ..... pounds...	18,390,027	
Lard ..... pounds...	24,435,014	
Horned cattle ..... number...	1,076	2,214,554
Beef ..... barrels...	126,041	
Tallow ..... pounds...	3,926,598	
Hides ..... number...	25,955	
Butter ..... pounds...	2,658,911	862,343
Cheese ..... pounds...	3,763,932	
Tallow candles ..... pounds...	2,772,188	681,362
Soap ..... pounds...	5,190,880	
Horses ..... number...	1,390	246,731
Mules ..... number...	1,337	
Leather and morocco skins	.....	6,448
Leather ..... pounds...	1,172,561	673,708
Boots and shoes ..... pairs...	440,709	
Sheep ..... number...	3,669	17,808
Wool ..... pounds...	216,472	26,567
Skins and furs	.....	796,101
Wax ..... pounds...	376,693	113,602
Apples ..... barrels...	45,075	107,283
Bread stuffs—		
Indian corn ..... bushels...	2,274,909	1,374,077
Indian meal ..... barrels...	212,118	709,974
Wheat ..... bushels...	3,890,141	4,354,403
Flour ..... barrels...	2,920,918	14,783,394
Rye meal ..... barrels...	8,910	34,186
Rye, oats, &c	.....	165,824
Rice ..... tierces...	67,707	1,657,658
Biscuit, or ship-bread ..... barrels...	121,281	454,020
Biscuit, or ship-bread ..... kegs...	56,089	
Potatoes ..... bushels...	225,905	152,569
Cables and cordage ..... cwt...	8,125	103,216
Coal ..... tons...	79,510	336,003

STATEMENT—Concluded.

ARTICLES.	Number and quantities.	Valuation.
Cotton—		
Sea Island.....pounds...	11,165,165	$109,456,404
Other kinds.....pounds...	1,100,405,205	
Cotton, piece goods—		
Printed and colored.....	.....	1,086,167
White.....	.....	6,926,485
Twist, yarn, and thread.....	.....	22,594
All other manufactures.....	.....	733,648
Flaxseed.....bushels...	3,932	7,719
Flax and hemp—		
Hemp.....cwt...	2,413	18,195
Cloth and thread.....	.....	2,924
Bags and all other manufactures.....	.....	13,860
Ginseng.....pounds...	230,726	133,813
Hops.....pounds...	245,647	40,054
Ice.....	.....	175,056
Indigo.....pounds...	36	36
Linseed oil.....gallons...	18,266	15,468
Spirits of turpentine.....gallons...	634,371	347,492
Salt.....bushels...	515,857	119,729
Spirits from grain.....gallons...	360,633	141,173
Beer, ale, porter, and cider (in casks).....gallons...	133,979	64,677
Beer, ale, porter, and cider (in bottles).....dozen...	17,390	
Vinegar.....	.....	20,443
Spirits from molasses.....gallons...	1,065,396	329,381
Molasses.....	.....	17,582
Sugar, brown.....pounds...	672,274	33,854
Sugar, refined.....pounds...	5,155,057	375,780
Tobacco.....hogsheads...	159,853	11,319,319
Tobacco, manufactured.....pounds...	10,561,692	1,671,500
Snuff.....pounds...	39,641	
Wood, and its products—		
Staves and heading.....thousand...	28,693	2,578,149
Shingles.....thousand...	41,932	
Boards, plank, and scantling.....M. feet...	78,599	
Hewn timber.....tons...	45,564	
Other lumber.....	.....	123,743
Masts and spars.....	.....	129,628
Oak-bark and other dye.....	.....	118,894
Ashes, pot and pearl.....tons...	3,421	334,321
Tar and pitch.....barrels...	59,144	1,406,488
Rosin and turpentine.....barrels...	454,715	

Summary statement of the estimated quantities and valuation of the principal exports of the growth, produce, and manufacture of the United States, during the fiscal year, ending the 30th of June, 1854.
[Condensed from the Annual Report on Commerce and Navigation.]

ARTICLES.	Number and quantities.	Valuation.
Animals and their products—		
Hogs.....number...	279	$11,061,016
Pork.....barrels...	220,147	
Bacon and hams.....pounds...	45,953,473	
Lard.....pounds...	44,450,154	

STATEMENT—Continued.

ARTICLES.	Number and quantities.	Valuation.
Horned cattle.....number...	1,022	
Beef.....barrels...	126,220	$2,757,022
Tallow.....pounds...	9,325,471	
Hides.....number...	23,622	
Butter.....pounds...	3,774,634	
Cheese.....pounds...	7,003,974	1,258,393
Tallow candles.....pounds...	3,389,577	
Soap.....pounds...	5,445,869	888,557
Horses.....number...	1,241	
Mules.....number...	903	200,098
Leather and morocco skins.....	.....	15,882
Leather.....pounds...	1,763,066	
Boots and shoes.....pairs...	455,680	893,723
Sheep.....number...	2,642	15,194
Wool.....pounds...	114,268	33,895
Skins and furs.....	.....	888,531
Wax.....pounds...	327,554	87,140
Apples.....barrels...	15,326	51,766
Bread stuffs—		
Indian corn.....bushels...	7,768,816	6,074,277
Indian meal.....barrels...	257,403	1,002,976
Wheat.....bushels...	8,036,665	12,420,172
Flour.....barrels...	4,022,386	27,701,444
Rye meal.....barrels...	23,624	112,703
Rye, oats, &c.....	.....	576,195
Rice.....tierces...	105,121	2,634,127
Biscuit, or ship-bread.....barrels...	107,844	495,340
Biscuit, or ship-bread.....kegs...	34,582	
Potatoes.....bushels...	140,575	121,680
Cables and cordage.....cwt...	14,443	186,766
Coal.....tons...	93,884	443,506
Cotton—		
Sea Island.....pounds...	10,486,423	93,596,220
Other kinds.....pounds...	977,346,683	
Cotton, piece goods—		
Printed and colored.....	.....	1,136,493
White.....	.....	3,927,148
Twist, yarn, and thread.....	.....	49,315
All other manufactures.....	.....	422,560
Flaxseed.....bushels...	2,757	4,958
Flax and hemp—		
Hemp.....cwt...	9,210	93,699
Cloth and thread.....	.....	24,456
Bags and all other manufactures.....	.....	55,261
Ginseng.....pounds...	37,491	17,339
Hops.....pounds...	260,026	63,763
Ice.....	.....	202,118
Indigo.....pounds...	1,509	1,320
Linseed oil.....gallons...	32,622	28,609
Spirits of turpentine.....gallons...	1,669,523	1,055,720
Salt.....bushels...	548,185	159,026
Spirits from grain.....gallons...	780,056	280,648
Beer, ale, porter, and cider, (in casks,).....gallons...	118,669	53,385
Beer, ale, porter, and cider, (in bottles,).....dozen...	16,702	
Vinegar.....	.....	16,945
Spirits from molasses.....gallons...	2,120,620	809,965
Molasses.....	.....	130,924
Sugar, brown.....pounds...	5,104,340	220,256
Sugar, refined.....pounds...	4,789,411	370,488
Tobacco.....hogsheads...	126,107	10,016,046
Tobacco, manufactured.....pounds...	10,273,152	1,550,327
Snuff.....pounds...	36,287	

STATEMENT—Concluded.

ARTICLES.	Number and quantities.	Valuation.
Wood and its products—		
Staves and heading.....thousand...	34,594	
Shingles.....thousand...	26,174	$5,122,854
Boards, plank, and scantling.....M. feet...	197,154	
Hewn timber.....tons...	41,964	
Other lumber.....	.....	165,178
Masts and spars.....	.....	130,522
Oak-bark and other dye.....	.....	95,863
Ashes, pot and pearl.....tons...	3,217	322,728
Tar and pitch.....barrels...	76,989	2,066,306
Rosin and turpentine.....barrels...	601,280	

Summary statement of the estimated quantities and valuation of the principal exports of the growth, produce, and manufacture of the United States, during the fiscal year, ending the 30th of June, 1855.
[Condensed from the Annual Report on Commerce and Navigation.]

ARTICLES.	Number and quantities.	Valuation.
Animals and their products—		
Hogs.....number...	431	$2,192
Pork.....barrels...	8,639	4,390,979
Pork.....tierces...	285,801	
Bacon and hams.....pounds...	38,188,989	3,195,978
Lard.....pounds...	39,025,492	4,018,016
Lard oil.....gallons...	103,200	82,945
Horned cattle.....number...	1,501	84,680
Beef.....barrels...	46,375	2,600,547
Tallow.....pounds...	11,866,992	1,352,406
Hides.....number...	114,787	361,982
Butter.....pounds...	2,315,249	418,723
Cheese.....pounds...	4,846,568	514,034
Adamantine and other candles.....pounds...	4,014,457	699,141
Soap.....pounds...	7,714,243	412,208
Horses.....number...	1,003	108,484
Mules.....number...	912	83,420
Leather and morocco skins.....	.....	36,045
Leather.....pounds...	1,488,385	288,867
Boots and shoes.....pairs...	616,104	763,539
Sheep.....number...	4,235	18,837
Wool.....pounds...	88,886	27,802
Skins and furs.....	.....	709,531
Wax.....pounds...	257,415	69,905
Apples.....barrels...	33,959	107,643
Bread stuffs—		
Indian corn.....bushels...	7,807,585	6,961,571
Indian meal.....barrels...	267,208	1,237,122
Wheat.....bushels...	798,884	1,329,246
Flour.....barrels...	1,204,540	10,896,908
Rye meal.....barrels...	35,364	236,248
Rye, oats, &c.....	.....	238,976
Rice.....tierces...	52,520	1,717,953
Rice.....barrels...	19,774	
Biscuit, or ship-bread.....barrels...	110,907	657,783
Biscuit, or ship-bread.....kegs...	42,380	
Potatoes.....bushels...	81,823	203,416

STATEMENT—Concluded.

ARTICLES.	Number and quantities.	Valuation.
Cables and cordage.....cwt...	23,728	$315,276
Clover seed.....	.....	13,570
Coal.....tons...	110,586	637,006
Cotton—		
Sea Island.....pounds...	13,058,590	
Other kinds.....pounds...	995,366,011	88,143,844
Bales.....number...	2,303,403	
Oil cake.....	.....	739,589
Cotton, piece goods—		
Printed and colored.....	.....	2,613,655
White.....	.....	2,793,910
Duck.....	.....	113,366
Other manufactures.....	.....	336,250
Flaxseed.....bushels...	5,808	6,016
Hemp.....cwt...	13,289	121,320
Hemp, manufactured—		
Cloth and thread.....	.....	2,506
Bags and all other manufactures.....	.....	34,002
Ginseng.....pounds...	47,367	19,796
Hops.....pounds...	4,021,816	1,310,720
Ice.....tons...	41,117	190,793
Linseed oil.....gallons...	56,692	49,580
Onions.....	.....	64,496
Salt.....bushels...	536,073	156,879
Spirits of turpentine.....gallons...	2,339,138	1,137,152
Spirits from grain.....gallons...	742,961	384,144
Spirits from molasses.....gallons...	3,269,231	1,448,280
Spirits from other materials.....gallons...	166,199	101,836
Beer, ale, porter, and cider (in casks).....gallons...	84,194	18,603
Beer, ale, porter, and cider (in bottles).....dozen...	13,615	26,466
Vinegar.....gallons...	147,664	17,281
Sugar, brown.....pounds...	4,062,625	286,408
Sugar, refined.....pounds...	7,098,320	526,463
Molasses.....gallons...	790,956	189,830
Tobacco—		
Hogsheads.....	150,213	
Cases.....	13,366	14,712,468
Bales.....	12,913	
Manufactured.....pounds...	9,624,282	1,486,075
Snuff.....pounds...	72,534	14,038
Wood, and its products—		
Staves and heading.....thousand...	89,454	1,922,288
Shingles.....thousand...	36,825	143,362
Boards, plank, and scantling.....M. feet...	144,718	2,544,065
Hewn timber.....tons...	52,377	306,643
Other lumber.....	.....	677,659
Oak-bark and other dye.....	.....	99,168
Ashes, pot and pearl.....tons...	3,596	448,499
Tar and pitch.....barrels...	89,999	288,028
Rosin and turpentine.....barrels...	731,060	1,761,428

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